Exhibit 12

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE, INC., Petitioner, vs. COREPHOTONICS, LTD., Patent Owner.	IPR2020-00905 IPR2020-00906

VIDEOTAPED VIDEOCONFERENCE DEPOSITION OF

EXPERT WITNESS

JOHN C. HART, Ph.D.

April 29, 2021

9:02 a.m. (CST)

Reported By:

Mayleen Ahmed, RMR, CRR, CRC, CSR

Job No.: 1961

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MOTIONS TO STRIKE None
INSTRUCTIONS NOT TO ANSWER None
DOCUMENT/INFORMATION REQUESTS None

---------- REFERENCED DOCUMENTS ----------

EXHIBIT DESCRIPTION PAGE
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DEPOSITION OF JOHN C. HART, Ph.D. - April 29, 2021

THE VIDEOGRAPHER: We are on the record on April 29, 2021, at approximately 9:02 a.m. Central time for the remote video deposition of Dr. John Hart in the matter of Apple, Inc. versus Corephotonics Ltd., IPR No. 2020-00905 and 2020-00906.

My name is Valerie Beltran, and I am the videographer.

Will counsel please introduce themselves for the record, beginning with the party noticing this proceeding.

MS. SIVINSKI: Good morning. My name is Stephanie Sivinski, with Haynes and Boone, for Apple. And I'm joined today by my colleagues Mike Parsons and Bethany Love, also with Haynes and Boone, and then Priya Viswanath from Cooley LLP.

MR. LINK: My name is Jonathan Link with the law firm of Russ, August & Kabat, on behalf of the Patent Owner, Corephotonics.

THE VIDEOGRAPHER: Thank you.

Will the court reporter please swear in the witness.

THE REPORTER: I'm going to ask that you

please raise your right hand.
Do you solemnly swear under penalty of perjury that you are Dr. John Hart, and the testimony you are about to give in the matter now pending shall be the truth, the whole truth, and nothing but the truth?
THE WITNESS: I do.
THE REPORTER: Thank you.

JOHN C. HART, Ph.D.
having been duly sworn, testified as follows:

EXAMINATION
BY MS. SIVINSKI:
Q. All right. Good morning, Dr. Hart. How are you?
A. Good morning. I'm fine. How are you?
Q. I'm good. Thanks.
Okay. Have you given testimony in a remote deposition before?
A. Yes, I have.
Q. Okay. So you're familiar with Zoom and the chat function for downloading exhibits and those sorts of things?

A. Yes, I am.
Q. Where are you testifying from today?
A. My daughter's bedroom in Champaign, Illinois. This is where I conduct the business, including expert services. I mean, not from my daughter's bedroom but from Champaign, Illinois.
Q. Yeah. Understood. We're all very, very fancy these days with our -- with our office digs. Okay. Good.
Is there anyone else in the room with you?
A. No, there's not.
Q. Okay. And will you agree not to communicate with others, including Corephotonics' attorneys, while questions are pending?
A. Understood and agreed.
Q. Great.
Do you have any access to notes from where you're sitting today?
A. No, I do not. I mean, there are notes on my computer, but I am not accessing those notes. I will not access those notes.
Q. All right. Thank you.
Is there any reason that you cannot give truthful and accurate testimony today?

A. No.
Q. All right. So I know that you sat for depositions before, but just so we can all be on the same page, a few rules.
Can you agree to answer pending questions before we take a break?
A. Yes.
Q. And if you don't understand a particular question, do you agree to let me know so I can clarify my question?
A. Yes.
Q. Do you understand you're testifying today about a Declaration that you submitted in two different IPRs?
A. Yes.
Q. And those would be IPR2020-905 and IPR2020-906?
A. Yes.
Q. And I loaded a copy of the Declaration that you submitted in those IPRs into the chat function.
(Exhibit 2001 introduced.)
BY MS. SIVINSKI:
Q. Does that document look like the Declaration that you submitted?

A. Yes, it does.
Q. As you sit here today, is there anything you need to correct about that Declaration?
A. I think there are minor spelling errors and so on throughout, but -- but I believe the meaning and -- there's no substance -- substantive corrections I would -- I would want made at this point.
Q. Perfect.
(Exhibit APPL 1001 introduced.)
BY MS. SIVINSKI:
Q. All right. And I've also loaded a copy of U.S. Patent No. 10,225,479, and that is the patent at issue in these IPRs.
Do you recognize that document that I've loaded in the chat?
A. Yes, I do.
Q. And have you read that patent?
A. Yes, I have.
Q. Memorized it?
Okay. Is it okay if I call that the '479 patent today?
A. Yes. That'll be fine.
Q. All right. If you will turn with me to pages -- page 2 of your Declaration. I just want to

go over some of the summaries of your opinions there.

Do you see on page 2 and extending through page 4 of your Declaration, a bullet-pointed list of materials?

A. Yes, I do.

Q. Are these the materials that you considered in drafting your Declaration?

A. Yes.

Q. Did you read all of these materials?

A. Yes. There's also item C on page 5 that I also considered. It's not materials. It's just the level and skill of a person having ordinary skill in the art.

Q. Understood. Thank you for that addition.

Is all of the analysis you performed for these IPRs reflected in your Declaration?

A. The opinions based on that analysis are -- are reported in my opinion -- in this Declaration.

Q. How many hours did you spend on your work for this Declaration?

A. Somewhere between 50 and 60 hours.

Q. And did you write your Declaration?

A. Yes, I did.

Q. Other than your lawyers -- and I don't want to know any conversations between you and Corephotonics' lawyers -- did you talk to anyone in preparing for your deposition today?

A. No, I did not.

Q. And other than Corephotonics' lawyers, did you talk to anyone in preparing this Declaration?

A. I'm not sure I understand the difference between that question and the question you asked before it.

Q. Sure. So it might be the same answer, but with one, I was talking specifically about the preparation for your deposition. And with this second question, I'm asking more broadly about your work in this case and your preparation of your Declaration.

A. Oh. So I've not spoken to anybody else in the preparation for both.

Q. So are you aware that Dr. Moore has also submitted a declaration for the 905 and 906 IPRs?

A. Yes, I am.

Q. Okay. And would you agree with me that Dr. Moore's declaration is related to the lens

design aspects of the 905 and 906 IPRs?

A. I don't have an opinion that I'm aware of at the moment that characterized Dr. Moore's deposition in that particular ways.

Is -- is there a statement in my Declaration stating that?

Q. Well, I -- I am planning on asking you questions today that are slightly broader than your Declaration.

So my question is whether you would agree with me that that's the case, whether or not you stated it in your Declaration.

Would you agree with me that Dr. Moore's declaration is directed towards the lens design elements of the 905 and 906 IPRs?

A. I'm not going to pigeonhole Dr. Moore's declaration in any way. I did refer to Dr. Moore's declaration in, for example, patents describing lens designs.

Q. Okay. Well, let me ask this question.

Do you consider yourself a lens design expert?

A. I wasn't asked to declare myself as a lens design expert in the -- in preparing these opinions. I have experience in lens design. I have

training in optics and understand, you know, the physics of lenses, the characteristics of lenses.

I have not, you know, physically built any lenses. My work on lenses has been more theoretical. I'm certainly an expert in ray tracing, and ray tracing is an element of lens design.

So I don't believe I have an opinion in the report that claims to -- where I'm an expert in lens design, but I did understand lens design and was able to understand Dr. Moore's report.

Q. Okay. Would you -- do you think Dr. Moore is an expert in lens design?

A. Yes, I do.

Q. Okay. And I'm not intending to limit the scope of his declaration. I'm just trying to get a general understanding that Dr. Moore has submitted opinions about lens design in these cases.

Would you agree with that?

A. Yes, I would.

Q. And that your Declaration is focused more on the image processing aspects of the '479 patent?

A. I think the opinions I offer have -- have included both, but, certainly, I believe

I've -- I've offered perhaps more opinions on -- on the other aspects than lens design.

Q. Are you familiar with the software that's used in connection with lens design, for example, Zemax?

A. Yes, I'm aware of it.

Q. Have you ever used it?

A. No.

Q. Did you review any Zemax files in connection with your work for the 905 and 906 IPRs?

A. Only by name and in -- in their reference in Dr. Moore's reports and the other documents in my materials that I considered.

Q. Do you know what a Zemax black box model is?

A. Yes.

Q. Can you describe what a Zemax black model is -- black box model is for me?

A. Yes. It describes the design of the -- of the lens -- of a lens system in such a way that you can see the effects of the lens system without revealing the details of the lens system design.

Q. And what is your understanding of what Zemax black box models are used for?

A. I think in this case, a Zemax black box

model was provided to demonstrate the effectiveness of an invention to somebody seeking to eventually utilize that invention without revealing the details of -- of the specific implementation.

Q. And this is perhaps an obvious question, but why would someone want to use a Zemax black box model in your experience?

A. If they would like to understand how something works, but are not yet at a stage to need to understand the details of -- of how something was built or how something was implemented, just the effects without understanding the process.

Q. Would someone be able to copy a lens design after reviewing just a Zemax black box model?

MR. LINK: Objection. Outside the scope of his declaration.

A. I think it's certainly possible. You know, another example of a black box might be the machine code that -- when somebody is writing a program, for example, Microsoft Word, that -- that machine code can be decompiled and reverse-engineered.

Reverse-engineering is a broad field that -- that works in -- in a variety of cases and a variety of implementations.

So I -- I don't have an opinion that says it's impossible.

Q. Okay. Well, specifically with respect to the Zemax black box models that you talk about in your Declaration, would it be possible to copy a lens design from those Zemax black box models?

A. I don't believe I have an opinion stating that.

Q. Okay. Well, I'm asking you for your understanding whether that would be possible, as you sit here today.

A. I don't -- I don't believe I was asked to consider that. I -- I did not give an opinion that said that that was not possible, and that's the extent of my opinion.

Q. Can you turn with me to paragraph 133 of your Declaration.

Are you there? Sorry.

Are you there?

A. Yes.

Q. Okay. Perfect.

In paragraph 133, you conclude that, quote -- that:

"Petitioner copied the invention of the '479 patent (among other Corephotonics

technologies, which Petitioner also appears to have copied) is strongly implied by the course of conduct between the parties and the timing of petitioner's announcement of their dual-aperture camera in their iPhone 7 series..."

Do you see that portion of your Declaration?

A. Yes, I see that.

Q. Okay. Is your conclusion that Apple copied the invention of the '479 patent based on the [redacted]?

A. I believe that sentence is saying that Petitioner's actions strongly implied that they created what appeared to be technology that copied the technology provided to them by Core -- Corephotonics. I don't believe this sentence speaks to any, any one piece that -- that allowed me to form -- form that opinion over any other piece.

But the [redacted] was one of the pieces that was provided by Corephotonics to Petitioner.

Q. So I'm not sure I understand your answer.

Does the fact that Corephotonics

provided a [redacted] to Apple in your mind make it more likely that -- that Apple copied the invention of the '479 patent?

A. So the opinion I provided in my Declaration is that Petitioner appears to have copied the -- the invention. And Petitioner appeared to have copied the invention, based on the course of conduct between the parties and the timing of Petitioner's announcement and the details of the dual-aperture camera in the iPhone 7 that was demonstrated in fall of 2016 that includes materials that Petitioner received.

I'm not pointing to any one piece that's responsible for the -- that strong implication that that copying happened. I am stating that, you know, the sum of that evidence strongly implies that the invention was copied because a duplicate of the invention appears to have been released in the iPhone 7.

Q. And I understand what the sentence of your Declaration says, but what I'm asking is: The fact that Corephotonics shared a [redacted] with Apple, is that some of the evidence that you conclude strongly implies that the invention was copied?

MR. LINK: Objection. Asked and answered.

A. And I considered all of the evidence, including the fact that that black box model was -- was provided in -- in constructing my opinion in paragraph 133.

Q. Is it your opinion that someone could copy a lens design from a black box model?

MR. LINK: Objection. Asked and answered.

A. I don't have a specific opinion stating that. I also don't have a specific opinion stating that somebody could not do that.

Q. So you don't have an opinion either way about whether it would be possible to copy a lens design from a black box Zemax model, right?

A. I do not have an opinion because I wasn't asked in that level of detail to examine that -- that particular question in -- to form a separate opinion.

My opinion is that it appears that Petitioner copied the invention, and I considered all of the materials that Petitioner had. And -- and so that's certainly within the realm of possibility, but I did not examine that question

specifically and form a specific opinion on that particular question.

Q. So if I understand what you just said, you didn't form a specific opinion whether it would be possible.

Did you form a specific opinion on whether Apple had actually copied Corephotonics' [redacted]?

A. I don't have an opinion stating that -- tat Petitioner copied [redacted], based on that one piece of evidence.

Q. All right. We will talk more about these files in later segments, but I think we might get into confidential information. So I'm going to move away from this for now so we can sort of consolidate our confidential discussions.

Well, actually, sorry, one more general question.

Have you ever reviewed a Zemax black box model before?

A. No, not in detail.

Q. All right. So let's talk about your Declaration with respect to the 905 IPR.

So are you aware that Apple has submitted a proposed claim construction for the

limitation "fused image with a point of view of the Wide camera"?

A. Yes.

Q. And I take it from your Declaration that you disagree with Apple's proposed construction for that limitation, right?

A. Yes. I don't believe constructions are needed for any of the terms. I found them to be quite clear in plain and ordinary understanding for a POSITA at the time.

Q. Have you formed any opinion about whether claim 1 of the '479 patent is obvious under Apple's claim construction?

A. I did not use Apple's claim construction in my analysis of any of the claims.

Q. So if the Board finds that Apple's construction is proper, you don't have an opinion about whether the proposed -- or the construction -- or the combinations that Apple submitted render the '479 patent obvious?

(Witness reviewing document.)

A. I was seeing if there was a section of my report that had the specific text in it, but I believe if any further information becomes available on any of -- any of these materials, that I would

want to further amend my report.
Q. But just to make sure that I understand the answer to my question, if the Board finds that Apple's construction is proper, you have not rendered an opinion in this Declaration about whether the combinations Apple has submitted render the '479 patent obvious, correct?
A. I'm not a lawyer. I believe in the pages of the -- of the declaration I provided, I only considered the plain and ordinary meanings of -- of those terms for the claims.
If -- if it turns out that the Board wants to recognize a different construction for those claims, then I would want to amend the report to provide further opinions, based on that analysis.
Q. Okay. And just to be clear, you -- when you say you considered the plain and ordinary meaning of the terms, that is not the construction that Apple proposed, right, in your -- in your opinion?
MR. LINK: Objection. Vague.
A. So at the end -- I believe it's at the end of paragraph 46.
"In my opinion, a POSITA would understand the term to mean 'fused image in

which the positions and shapes of objects reflect the POV of the Wide camera.'"
So that's what I used for "fused image with the point of view of the Wide camera," and that disagrees with what was offered by Dr. Durand.
And then -- and then the plain and ordinary meaning I applied to the second construction is quite lengthy. It's summarized in -- well, paragraphs 47 through 49, because it's more of a grammatical issue.
So I'll just state, you know, my opinions in 47 through 49 explain the plain and ordinary meaning I understood from -- when viewed as -- by a POSITA at the time, what -- what that claim term referred to.
Q. Okay. So the last sentence of paragraph 46 of your Declaration is the construction that you used in rendering your opinions for this Declaration, right?
A. "Fused image in which the positions and shapes of objects reflect the POV of the Wide camera."
And the original claim construction was "fused image with the point of view of the Wide camera."

So there's a few extra terms there just to clarify the plain and ordinary meaning that a POSITA would understand from that -- from that set of terms.
I believe that is the plain and ordinary meaning of -- of that term, but I'm providing a few extra terms there to clarify it to make sure that the Board and anybody else would understand how that should -- how that would be understood by a POSITA and how it's different than what was being offered by Dr. Durand.
Q. Okay. Let me ask my question again, because I don't think you quite gave an answer to it.
You applied the following construction when rendering the opinions in your Declaration, "fused image in which the positions and shapes of objects reflect the POV of the Wide camera," correct?
A. That's correct, in that that's the understanding that I used to -- to analyze the patents. I believe that is the plain and ordinary meaning of those -- of those terms.
So I don't believe a construction is necessary, that that text is there to inform the

Board and anybody else of my understanding -- of my opinion of what a POSITA understands those terms to mean.
So, yes, I used -- I used that interpretation of that, which I believe a POSITA would understand is the plain and ordinary meaning of that term.
Q. Okay. Thank you.
So I want to take a look at a portion of the specification of the '479 patent in column 5.
And I'm specifically looking at the second paragraph in column 5, which runs from about line 11 to line 33.
Do you see that paragraph?
A. Yes, I do.
Q. And in that portion of the specification, it says:
"If the output image retains the Wide image shape, then it has the Wide perspective POV."
Do you see that?
A. Which line are you at?
Q. 16. The lines in this paragraph, of course, don't match up very well to the line number, but it is around line 16.

A. Understood. Approximate is fine. And yes, I see that:

"If the output image retains the Wide image shape, then it has the Wide perspective POV."

Where "POV" would stand for point of view.

Q. Okay. And then the next sentence right after that says:

"If it retains the Wide camera position, then it has the Wide position POV."

Do you see that?

A. Yes, I do.

Q. Okay. Would you agree with me that the specification is providing two components or two types of Wide POV, perspective and position, in those two sentences?

A. I don't believe I have an opinion. If I do, I don't have it in front of me, but I don't recall a specific opinion on those two sentence specifically -- sentences specifically.

The opinion I have is on the terms used in -- in the claims, for example, claim 1.

In claim 1:

"[W]herein the camera controller is

further operative to output the fused image with a point of view ... of the Wide camera by mapping [the] Tele image pixels to matching pixels within the Wide image."

And I don't see a distinction there between "position" and "perspective." I see "point of view."

Q. Okay. Well, you would agree with me that the specification makes a distinction between "perspective" point of view and "position" point of view, right?

A. Yeah. There's two sentences there. one is speaking of position. The other is speaking of perspective.

Q. Okay.

A. Both refer -- both refer to point of view.

Q. Right. So, again, would you agree with me that the specification sets out two types of Wide POV, perspective and position?

A. I didn't provide an opinion stating that. What I provided an opinion on was how claim 1 should be interpreted -- the terms of claim 1 should be interpreted.

The terms of claim 1 simply speak of a

point of view of a Wide camera. They don't speak of any position or perspective. They speak of point of view.

What I see in column 5 is talking about the point of view. It's referring to both the position and the perspective of the point of view.

Q. Is your conclusion about what claim 1 means based on the specification of the '479 patent?

A. Yes. And how a POSITA would understand that specification.

Q. Okay. Is your opinion about how claim 1 -- how a POSITA would understand claim 1 based on column 5 of the specification?

A. It's based on the entire specification, but, certainly, column 5 was included in that analysis. In fact, I cite to it, you know, these -- these specific terms, in paragraph 43 of my report.

Q. So do you have an understanding of how a POSITA would understand perspective POV and position POV?

A. Can you repeat that question? I'm sorry.

Q. Sure. That's okay.

You -- you testified earlier that you -- well, let me rephrase that.

I understood your testimony earlier that you didn't have an opinion specifically about perspective POV versus position POV, correct?

A. Well, so paragraph 45, you know:

"The '479 patent refers to 'combination' possibilities where an output image reflects only some aspects of a given POV..."

But when it refers to "Wide POV," without clarification, without talking about perspective or position, it's referring to the complete Wide POV, both perspective and position.

Q. Based on the text of paragraph 45 of your Declaration, would you agree with me that the specification of the '479 patent lists at least two aspects of POV, Wide perspective POV and Wide position POV?

A. The specification does, you know, describe Wide perspective POV and Wide position POV. I've cited to that in paragraph 45. Paragraph 45 concludes, though, that when Wide POV is being used without the terms "perspective" or "position," it's referring to both.

Q. Okay. So your opinion is that in order to retain the Wide POV, an output image must reflect

both the Wide perspective POV and the Wide position POV?
A. Yes. That's -- that's what's stated in paragraph 45.
Q. And what is the basis of that conclusion?
A. What's provided in the specification; how a POSITA would understand it. This section of the specification is talking about the -- about point of view. It's talking about the point of view for the Wide imaging system, and it's also decomposing "point of view" in terms of perspective and position.
And any POSITA would understand that a decomposition -- when you decompose something, you're talking about two aspects of one thing. And then if you later refer to that one thing that has previously been decomposed, analyzed as having two components, you would expect that one thing to have both components.
The -- the language in -- in column 5 are quite clear that -- that we're talking about one thing that has two components. And when we refer to that one thing, it -- it requires those two components, "those two components" meaning the

perspective component and the position component of the point of view.
Q. Other than the paragraph that we've been referring to in column 5, are there other specific portions of the specification that informed your view about the -- how a POSITA would understand the term "Wide POV"?
A. So the short answer to that is, I used the entire specification to inform my opinions about -- about the -- about the patent and the claims.
I believe I cited to other sections here -- you know, in paragraph 39, there's a citation to column 13 of the patent, for example.
(Witness reviewing document.)
I believe there's another citation to column 7.
So I think -- I think, you know, those -- those references indicate that I did consider the entire specification and certainly more than just what was in column 5.
Q. Understood that you considered the entire specification.
I guess what I'm trying to find out is: Are there other specific portions that you think reflect particularly about this "Wide POV" term?

You listed column --
MR. LINK: Objection. Compound. Sorry.
MS. SIVINSKI: It's okay.
Q. You pointed to column 13. And are you referring to the citation that begins of -- paragraph 39 of your Declaration?
A. Yes.
Q. And do you agree with me that that citation is pointing to the claim language of claim 1?
A. Yes.
Q. Okay. And then you also mentioned column 7. Are there particular line numbers that you were thinking about?
A. The ones that are shown here are 7 and 8 and 11 through 13.
Q. Let's take a look at those.
A. And 20 through 22.
Q. So let's look at 7 through 8 and 11 through 13.
How does this portion inform your understanding of the meaning of the term "Wide POV"?
A. So this section of the '479 refers to "field of view," "FOV," and the field of view is also something a POSITA would understand. And

it's -- you know, the -- the specification is using "field of view" in a manner consistent with the POSITA's understanding at the time.
And the field of view is the -- you know, the angle of -- of the view as opposed to where the view is taking place, for example, the position of the view.
And Dr. Durand's construction -- I reproduce it in my paragraph 36 -- it's a fused image that maintains the Wide camera's field -- field of view or both the Wide camera's field of view and position.
And in, you know, Dr. Durand's construction of just looking at the point of view as including the Wide camera's field of view, that would seem to imply that -- that "point of view" was referring to field of view only.
And it's quite clear in column 7 that the patent understands the difference between "point of view" and "field of view," because it refers to them separately. It uses the term "FOV" for field of view and "POV" for point of view.
And so if it wanted to refer to just the Wide camera's field of view, it would have referred to "Wide FOV" and not "Wide POV."

Q. Given a particular Wide angle lens, if you take an image from that -- generate an image from that camera, the image will reflect the Wide camera's field of view, right?
A. You're asking if -- I'm not sure what you're asking. Can you -- can you repeat that?
Q. Sure.
A. I'm sorry.
Q. That's okay.
If I have a camera with a Wide angle lens and I take a photograph with it -- or take an image with it, okay, that image will reflect the Wide camera's field of view, right?
A. I mean, I have to look at the specifics of the system. The field of view -- you know, you have to look at, you know, how -- how that system projects onto a sensor and the configuration of that sensor.
Is there a specific case you want to look at or --
Q. Well, no, not right now.
If -- if I take the same Wide angle lens, I've taken an image with it, will that image reflect the Wide camera's point of view?
A. I'm not sure what you're -- what you're

speaking about. You're talking about, you know, some camera I don't know. I'd have to look at the camera to -- to be able to state something that certain, with that much certainty.
I gave an example --
Q. What happens -- sorry.
A. -- in paragraph 44.
There's an example from Dr. Szeliski's book showing images taken from two different points of view that you could use to, you know, look at the difference between field of view and point of view.
Q. Okay. I'm asking a pretty simple question, and I don't -- I'm not sure we need to look at specific examples for it.
If I take an image with a Wide angle lens, doesn't that image reflect the Wide angle lens' point of view?
A. I'm -- yeah. I don't know. I mean, I've got some examples -- some specific examples of what "point of view" means. I'm not sure what you mean by "reflect" that camera's point of view.
We're tossing around terms that are, you know, very carefully analyzed in claim construction. And, you know, answering, you know, a hypothetical question about a hypothetical camera without knowing

any details about that camera system, I'm not sure what you're asking.
If you want to ask me about a specific camera, for example, some of the examples I've provided in the report or some of the examples provided in the patents, I'm happy to speak to those. Those are what my opinions reflect.
I mean, I give an example in paragraph 44 of a -- of a sample image recorded from a camera with a given field of view and point of view.
Q. How does field of view relate to the point of view of a camera?
A. Well, there's an example I provide in paragraph 44. There's two images, (a) and (b), reproduced from Szeliski, I believe, at page 468. And -- I mean, it's page 22 of the report, page 468 of Szeliski.
And it shows, you know, what looks like a birdhouse in front of a scene. And these two images share the same field of view, but they have different points of view.
Q. Okay. The lens that captured image (a) in the excerpt from Szeliski that you're referring to had a point of view when that image was captured, right?

A. Right.
Q. And that image reflects the camera's point of view, right?
A. Yes.
Q. Does image (a) also reflect the camera's field of view when that picture was taken?
A. Yes.
Q. Thank you.
So going back to column 5 of the specification of the '479 patent, I'm looking at line 23, and it says:
"In fused images, it is possible to register Tele image pixels to a matching pixel set within the Wide image pixels, in which case the output image will retain the Wide POV."
Do you see that?
A. Yes, I do.
Q. Do you agree with that statement?
A. Yes. I agree that the patent makes that statement.
Q. Well, do you agree, sir, that if you register Tele image pixels to a matching pixel set within the Wide image pixels, then the output image will retain the Wide POV?

A. Yes. I believe that the way that a POSITA would understand the patent is referring to "retain the Wide POV" is that matching pixels -- one way is that the matching pixels within the Wide image of the pixels in the Tele image would be registered to correspond with matching pixels in the Wide image pixels.

Q. And the claim talks about mapping Tele image pixels to matching pixels within the Wide image, right?

MR. LINK: Objection. Vague.

A. Yes. The last line of claim 1 refers to "by mapping Tele image pixels to matching pixels within the Wide image."

Q. Okay. What's the relationship between the word "mapping" in claim 1 and the word "register," as used in claim 5?

Are those used synonymously in the art, in the industry?

MR. LINK: Objection. Compound.

A. So the specification's giving, you know -- giving a description that helps -- helps a POSITA understand what's being referred to in the claim.

So when reading claim 1, you know, a

POSITA would understand that -- that mapping Tele image pixels to matching pixels within a Wide image could occur by that registration process, the term "register" in column 5.

Q. Okay. I also want to look at the last sentence of that paragraph in the specification in column 5 that we've been looking at. So that's around line 30. And it says:

"It is also possible to perform the registration after either sub-camera image is shifted, in which case the output image will retain the respective Wide or Tele perspective POV."

Do you see that?

A. Yes, I do.

Q. Based on this teaching, if you wanted to create a fused image that retained the Wide POV, you don't necessarily have to shift the Tele image pixels first, right?

A. I believe column 5 is giving two examples that -- that could be used.

Q. I don't think that answered my question. Let me ask it again.

If I -- if I wanted to -- let me rephrase it.

Is it possible to create a fused image that retains the Wide POV without shifting pixels?

MR. LINK: Objection. Asked and answered.

(Witness reviewing document.)

A. Can you repeat the question?

Q. Is it possible to create a fused image that retains the Wide POV without shifting pixels?

MR. LINK: Objection. Asked and answered.

A. And I don't believe I have any further opinion on that. I believe I -- I looked at claim 1, whether a POSITA would understand what claim 1 said with reference to the specification.

I didn't look at all the possible ways that claim 1 could be satisfied, just that a POSITA would understand how claim 1 could be satisfied.

So I didn't -- I don't think I have an opinion on that level of detail about -- about that question. If there is one, I'm happy to clarify it, but I don't recall needing to -- to look at that level of detail to understand -- to provide a POSITA's understanding of those -- of that -- of that claim -- that claim language in column 5.

Q. Okay. Well, regardless of whether you

have rendered an opinion in your Declaration about my question, what I'm asking: Do you have an opinion, as you sit here today, whether or not it's in your Declaration, of how a POSITA would understand this line?

Would a POSITA understand that you can create a fused image that retains the Wide POV without shifting pixels?

A. As I sit here today, I don't have an opinion on that particular line. I wasn't -- my Declaration is in response to Dr. Durand's declaration regarding the IPR.

This particular question wasn't posed by Dr. Durand. I didn't analyze this particular question when I was providing my opinions.

In order to provide an opinion on that, I'd need to spend as much time as I spent preparing this Declaration responding to Dr. Durand's questions to -- to render an opinion on that.

Q. Okay. Let's look at the last line of paragraph 46 of your Declaration, which is on page 23.

We talked earlier that this line is your description of how a POSITA would understand the claim limitation about retaining the Wide POV,

right?
A. You're talking about the line: "In my opinion, a POSITA would understand this term to mean 'fused image in which ... positions and shapes of objects reflect the POV of the Wide camera'"?
Q. Yes, sir. That's the --
A. That's -- that's my opinion.
Q. Do you have an opinion about whether or not your construction or description of this claim limitation requires shifting pixels?
A. I don't -- I don't recall a specific opinion involving determining the difference between shifting pixels or other methods for -- in relation to that claim element. I don't recall Dr. Durand asking anything regarding shifting pixels in that claim element.
Q. So as we have been talking about, column 5 discusses an object's shape, right?
A. Is there a specific line in column 5?
Q. Sure. 16:
"If the output image retains the Wide image shape, then it has the Wide perspective POV."
A. Yes, I see that.
Q. Okay. How would you -- or would a

POSITA understand how to process the image, such that it retains the Wide image shape?
MR. LINK: Objection. Vague.
A. I believe so. Later in that paragraph in column 5, the specification is talking about registering "Wide image pixels to a matching pixel set within the Tele image pixels," and vice versa. And if --
"In fused images, it is possible to register Tele image pixels to a matching pixel set within the Wide image pixels, in which case the output image will retain the Wide POV...."
So I believe a POSITA would understand the term "register" there to indicate a process that -- that would preserve the Wide image POV.
Q. Are you familiar with the legal doctrine that a patentee can supply its own definition in the specification for particular claim limitations?
A. I believe my understanding -- I'm not a lawyer. I believe my understanding of the law is documented in -- in my Declaration, starting at paragraph 19.
Q. Starting at paragraph 19, is there anything in your Declaration that you believe

reflects the concepts that a patentee can supply its own definition for a claim term?
A. I don't see a specific element in -- at paragraph 19. Actually, what I'm talking about the level of a person of ordinary skill in the art...
(Witness reviewing document.)
Paragraph 14 explains that my understanding in the evaluation of this patent or any other patent:
"[T]he content of a patent or printed publication prior art should be interpreted [in] the way a person of ordinary skill in the art would have interpreted the prior art as of the effective filing date of the challenged patent."
And so I used that understanding of a person of ordinary skill in the art in reading the specification, including column 5.
I did not see any situations where I thought the -- you know, anything beyond the understanding of a person of ordinary skill in the art applying plain and ordinary meaning to each of the terms would not have been -- I did not see any situation where that would not have been sufficient.
I felt -- I felt that a person of

ordinary skill in the art would have understood everything stated in the specification under the plain and ordinary meaning.
MS. SIVINSKI: We've been going about an hour, maybe a few minutes less, but I'm about to go into another large nodule. So it probably makes sense to take a quick five-minute, ten-minute break now.
Does that work for you, Dr. Hart?
THE WITNESS: That sounds good. Could we get a precise time that we're going to reconvene?
MS. SIVINSKI: Sure. Let's reconvene at 10:10.
THE WITNESS: Thank you.
THE VIDEOGRAPHER: Okay. The time is 10:00 a.m., and we're going off the record.
(Recess taken.)
THE VIDEOGRAPHER: The time is 10:12 a.m., and we're back on the record.
BY MS. SIVINSKI:
Q. Welcome back, Dr. Hart.
Okay. So I want to focus now on ground 1 of the 905 IPR. And your discussion of that starts on page 38 of your Declaration, if that's helpful.

A. Okay.
Q. So in ground 1 of the 905 IPR, Apple argues that the relevant claims are obvious over the combination of Parulski and Konno, right?
A. Yes. That's what I show.
Q. And with respect to that ground, Apple's position is that Figure 16 of Parulski discloses the dual-aperture camera that meets certain limitations of claim 1, right?
A. So there's a chart. Can you -- what was the question again?
Q. Sure. Let me read it to you.
With respect to ground 1 of the 905 IPR, Apple's position is that Figure 16 of Parulski discloses the dual-aperture camera that meets certain limitations of claim 1, right?
THE REPORTER: Counsel, we may have to do something with your microphone. It's starting to get a little bit fuzzy.
MS. SIVINSKI: Let's go off the record.
THE VIDEOGRAPHER: The time is 10:14 a.m., and we're going off the record.
(Recess taken.)
THE VIDEOGRAPHER: The time is 10:16 a.m., and we're back on the record.

BY MS. SIVINSKI:
Q. Okay. Hopefully, this is better.
Dr. Hart, can you hear me okay?
A. Yes, I can.
Q. All right. So I'm going to repeat my last question so we can all be on the same page and get an answer to that one before we move on.
With respect to ground 1 of the 905 IPR, Apple's position is that Figure 16 of Parulski discloses the dual-aperture camera that meets certain limitations of claim 1, right?
A. I'm looking at Dr. Durand's report, the element "dual-aperture digital camera for imaging" includes, for examples, Figures 15 and Figure 16.
So 16 is certain -- Figure 16 is certainly -- appears in the chart of Dr. Durand's declaration with regards to that first claim element of claim 1.
Q. Okay. And did you analyze the Parulski reference in connection with your work in preparing your Declaration?
A. Yes, I did.
Q. Okay. And did you specifically analyze Figure 16?
A. Yes. I analyzed all of Parulski: all of

the figures, all of the specifications.
Q. Okay. Does Parulski Figure 16 show a miniature lens assembly?
(Witness reviewing document.)
A. I'm not sure about the characterization of "miniature." Parulski refers to it as "two image capture stages in a single stage for a mobile phone camera."
Q. Are you familiar with the terminology "miniature lens assembly"?
A. Do you have a context in which it was used?
Q. Yes. Well, I don't have a specific line number of Parulski to point you to, but is -- would a POSITA be familiar with the concept of a miniature lens assembly?
A. I think the general answer is yes, but it would depend on the context in which it was being used.
Q. Okay. Is there a rule of thumb that a POSITA would apply in determining whether a particular lens assembly is considered miniature or not?
A. I don't recall providing an opinion on that. Again, I think all of these issues are an

issue of context, the setting in which the lens system is being presented, what "miniature" would be referring to.
Q. Okay. Well, let's talk specifically about the mobile phone application.
You're aware that Parulski and the '479 patent deal with lens assembly for miniature -- sorry, for mobile phones, correct?
A. Yes.
Q. Okay. Would you consider a lens assembly for a mobile phone to be a miniature lens assembly?
MR. LINK: Objection. Beyond the scope.
A. I don't recall using the term "miniature" or needing to use the term "miniature" in my opinions. So if there's an opinion where I've used the word "miniature," I'm happy to clarify that.
Otherwise, my understanding is that these lens systems are appropriate for use in a variety of contexts, including mobile phone-scale devices.
Q. Okay. Dr. Hart, do you understand that I'm allowed to ask you questions today that are about things that a POSITA would understand?

A. Yes, that's my understanding.
Q. Okay. Would a POSITA have an understanding of what a miniature lens assembly is in the context of a mobile phone?
MR. LINK: Objection. Beyond the scope.
A. It would depend on what the term "miniature" is being used, the context of that.
I believe a POSITA would understand both Parulski and the '479. In referring to lens systems, the POSITA would have a good understanding of the scale of those lens systems, based on those descriptions.
Q. I'm not trying to make this a trick question. I'm trying to figure out whether there is a broadly understood definition of "miniature lens assembly" in this art space. And if there's not, that's fine.
I just want to know whether there is or not. So let me re-ask my question with that context.
Would a POSITA have understood any particular definition for what would constitute a "miniature lens assembly"?
MR. LINK: Objection. Beyond the scope.
A. I examined Parulski. I examined the

'479. I don't recall the term "miniature" being an important term if it was used.
Off the top of my head, I don't recall if the term "miniature" was used. I'd have to see the context in which it was used.
And beyond that, I don't have an opinion on the -- on the term "miniature" or what a POSITA would understand "miniature" to mean, beyond how the term "miniature" was being used in the context of a particular example.
Q. Okay. Are you aware -- have you read Dr. Moore's declaration in your work in connection with these IPRs?
A. Yes, I have.
Q. Okay. And are you familiar with his discussion of miniature camera modules?
A. Not by memory sitting here. I don't have a specific recall of any of the -- of the sections.
Q. Okay. Let me put Dr. Moore's declaration in the chat. Give me one moment.
MS. SIVINSKI: Well, it's being difficult to locate. Let's go off the record for one minute until I can get this loaded in the chat for us.

THE VIDEOGRAPHER: The time is 10:24 a.m., and we're going off the record.
(Recess taken.)
THE VIDEOGRAPHER: The time is 10:27 a.m., and we're back on the record.
MS. SIVINSKI: Okay. There is always one document that I don't have at my fingertips. So, hopefully, we've gotten that out of our system today, and the rest will go smoothly.
(Exhibit 2015 introduced.)
BY MS. SIVINSKI:
Q. Okay. So I have put in the chat -- or my colleague has put in the chat Dr. Moore's declaration.
Do you have that available to you now, Dr. Hart?
A. Yes, I do.
Q. Okay. If you will turn with me to paragraph 39 of that declaration, which is on page 20. Let me know when you're there.
A. I'm there.
Q. Okay. And you'll see the first sentence of that paragraph says:
"As shown in the following table, published in 2014, a camera module using a

one-half" -- sorry, "1/2.5 inch megapixel image sensor would be considered a 'miniature camera module.'"
Do you see that?
A. Yes, I do.
Q. Okay. Are you familiar with the context in which Dr. Moore is discussing a "miniature camera module"?
A. Yes. I think Dr. Moore does a really good job here of establishing that context by giving a scale.
Q. Okay. Do you agree with Dr. Moore that this information contained in paragraph 39 of his declaration is how a POSITA would understand the term a "camera module" -- sorry, a "miniature camera module"?
MR. LINK: Objection. Misstates Dr. Moore's declaration.
A. So the full paragraph states that this "following table" -- it gives a scale -- "would be considered a 'miniature camera module'" -- in quotes -- "as would the smaller camera modules likely to be used in Parulski's mobile phone embodiment."
So I don't believe Mr. Parulski is stating anything beyond that in this paragraph. And

so I take this paragraph at face value. Mr. Parulski is providing an explicit context in which he is going to refer to a, quote/unquote, miniature camera module.

Q. Are you familiar with Table 1.1 that Dr. Moore has included on page 20 of his declaration?

A. Yes. I see it right in front of me.

Q. Okay. Using that context of Table 1.1 in Dr. Moore's declaration, does Parulski Figure 16 constitute a miniature camera module?

MR. LINK: Objection. Vague.

(Witness reviewing document.)

A. So my opinions on this agree with -- with Dr. Moore's opinions. So I don't recall specifically if -- if the Moore report is referring to Figure 16 in such a way.

I did not find anything objectionable in Dr. Moore's report. I agreed with Dr. Moore's report. I was able to follow Dr. Moore's report. And my opinions on -- on this would -- would match Dr. Moore's opinions on -- on this particular subject matter.

So I -- I don't have any opinions in addition to Dr. Moore's opinions on, specifically,

Figure 16.

Q. Okay. Would a POSITA be able to take the table included in Dr. Moore's declaration and take the disclosure of Parulski and figure out which category Parulski Figure 16 would fall in?

MR. LINK: Objection. Beyond the scope. Vague.

A. I don't have any opinions beyond what's stated in my report and Dr. Parulski's report -- declarations.

And paragraph 39 says that "a camera module using [that scale] would be considered a 'miniature camera module,' as would the smaller camera modules likely to be used in Parulski's mobile phone environment."

I believe Mr. Parulski is similarly -- sorry. I believe Dr. Moore is similarly speaking in the -- in terms of what a POSITA would understand.

Q. Okay. Do you see Table 1 includes, under the "Inch Format" column, three headings that are bolded and italicized: "Miniature Camera Modules," "Digital Still Cameras," and "Film Cameras"? Correct?

A. Yes, I see that.

Q. Okay. Do you know, based on the

teachings of Parulski, what the image -- sorry, the inch format would be for the Parulski Figure 16?

MR. LINK: Objection. Beyond the scope.

A. I don't recall the specific opinion in my Declaration to that. And off the top of my head, I don't recall the specific declaration in Dr. Moore's opinion on that.

Is -- is there a specific opinion that you'd like me to elaborate on?

Q. I'm not asking you about opinions in your Declaration. I'm asking you what Parulski teaches.

And you told me earlier that you studied what Parulski taught in order to render the opinions in your Declaration, right?

A. That's correct.

Q. Okay. Do you agree with me -- or would you agree with me that Figure 16 of Parulski is intended to be used in a mobile phone application?

A. My opinions are in -- in the declaration. They're in response to the opinions provided by Dr. Durand. And so my opinions focused on responding to those. That was the focus of my analysis.

I don't recall being asked that

particular question by -- or being asked to respond to that particular question in Dr. Durand's opinions.

So I don't recall an opinion on that. And so I don't have a further opinion on that question.

Q. So you don't know whether Figure 16, as disclosed in Parulski, is for use in a mobile phone?

(Witness reviewing document.)

A. I believe I answered that question already. Figure 16, as mentioned by Parulski in column 9, depicts a diagram for "a stage containing two image capture stages and a single stage for a mobile phone camera."

Q. So that's a yes?

A. Yes. Parulski describes Figure 16 for a mobile phone camera.

Q. Okay. Thank you.

Does Figure 16 of Parulski show two lenses that are next to one another?

MR. LINK: Objection. Vague.

(Witness reviewing document.)

A. It shows two stages, two image capture stages. I believe those stages -- let me see.

(Witness reviewing document.)

They consist of two imaging stages. The imaging stages would consist of lens systems. Each lens system could consist of multiple lenses, lens elements.

Q. Okay. Does Figure 16 of Parulski disclose two stages that are next to each other?

A. Yes.

(Exhibit APPL 1005 introduced.)

BY MS. SIVINSKI:

Q. All right. Let's look at Figure 14.

Are you familiar with this figure in Parulski?

A. Yes.

Q. Would you agree with me that you can use the teachings of Figure 14 or you could implement the teachings of Figure 14 with the dual-aperture camera disclosed in Figure 16?

A. I was getting a phone call on my computer, which --

Q. No problem.

A. I'm also a professor at the University of --

THE REPORTER: I'm barely able to hear the witness now.

THE VIDEOGRAPHER: Yes. He sounds very

low.

THE REPORTER: I thought it was just me.

THE VIDEOGRAPHER: Now we cannot hear you.

Should we go off the record?

MS. SIVINSKI: Yes, please. Thank you.

THE VIDEOGRAPHER: The time is 10:38 a.m., and we're going off the record.

(Recess taken.)

THE VIDEOGRAPHER: The time is 10:48 a.m., and we're back on the record.

BY MS. SIVINSKI:

Q. Okay. Let me re-ask you that question so we can sort of restart.

Would you agree with me that you can use the teachings of Parulski Figure 14 with the dual-aperture camera disclosed in Parulski Figure 16?

A. No. I don't agree with you on that. Off the cuff, I'd have to -- I don't recall having an opinion stating that. And I'd have to look at Parulski here to determine the platform Figure 14 was in reference to.

Q. Okay. Well, take a moment and look at Parulski.

(Witness reviewing document.)

A. So in looking at both the sections of Parulski referring to Figure 16 and Figure 14, I don't see Parulski showing that Figure 14 is an example of something that would be used with Figure 16.

I see reference of Figure 14 being used with Figure 1, and then later there's a discussion of Figure 16.

Q. Okay. Do you disclose any opinions in your Declaration that Figure 16 and Figure 14 of Parulski cannot be used together?

A. I don't recall any opinions, sitting here, in my Declaration nor in -- in the declaration -- and I don't -- I don't recall responding to anything in Dr. Durand's -- Durand's declaration indicating Figure 14 operating on the infrastructure shown in Figure 16.

Q. Let me re-ask my question, because I think you answered a different question than I asked.

Do you disclose any opinions in your Declaration that Figure 16 and Figure 16 -- sorry, Figure 16 and Figure 14 of Parulski cannot be used together?

A. I think I answered it. I don't recall, sitting here, any opinion stating -- stating that, nor do I recall responding to any opinion from Dr. Durand stating that.

Q. Okay. So I want to take you to column 28 of Parulski. Let me know when you're there.

A. Correct.

Q. And there's a paragraph that runs between lines 45 and 57. Do you see that paragraph?

A. Yes, I do.

Q. And a portion of that paragraph is describing Parulski Figure 14, correct?

A. Yes. Figure 14 is mentioned in that paragraph.

Q. And with respect to Figure 14, Parulski says in lines 53 to 54:

"Then the two images are combined into a modified image with a broadened depth of field."

Do you see that?

A. Yes. I see that sentence.

Q. Okay. What would a POSITA understand the phrase "broadened depth of field" to mean?

A. So the term "broadened depth of field" is further clarified by Parulski.

"The advantage is, this can be done without having to stop down the aperture of the primary lens to obtain the great -- obtain the greater depth of field, which is particularly useful in low light capture where a large aperture is preferred."

So "broadened depth of field" means that objects at a greater range of distances from the camera would still be in focus.

Q. And what would a POSITA understand the phrase -- well, Parulski discloses combining two images in lines 53 to 54, right?

A. Yes.

"Then the two images are combined into a modified image with a broadened depth of field."

Q. Okay. How would a POSITA understand Parulski's disclosure of combining two images?

(Witness reviewing document.)

A. It's rather vague. There is no specific algorithm provided for "combined."

And so I think the POSITA might look at "combined" and say picking one pixel from one image and another pixel from the other image, depending on what was -- what was being combined.

So a simple combination that a POSITA might look at under plain and ordinary meaning, as shown in the context of that paragraph and the context of Parulski, is simply picking pixels from either image and then replacing those -- using that pixel value in that location in the final image.

Q. Okay. Based on Parulski's disclosure and the state of the art, would a POSITA understand how to perform the technique that you just described in your last answer for combining two images?

A. I think a common way that a POSITA would have performed this is as a -- going through each pixel in the final image and deciding for each pixel if that pixel value is coming from the corresponding position in the first image or the second image.

Q. And would a POSITA correspond positions in the first image to positions in the second image?

A. That's just it. I think you'd have the X and Y coordinate of the pixel in the final image, and that would correspond to the X and Y coordinates of the pixel in the first image and the X and Y coordinates of the pixel in the second image.

Q. Can you use the range map to correspond X and Y coordinates of a pixel in a first image with X and Y coordinates of a pixel in a second image?

A. I did not provide an opinion on that that I recall sitting here with respect to that particular element. Parulski does not explicitly say that a range map should be used for that combination.

So I'm happy to elaborate if -- you know, if I've responded to that question in my opinions, but just sitting here, I don't see that Parulski suggests using the range map in that sentence. I don't see "range map" in that sentence or in --

Q. Okay. Well, beyond -- sorry. I did interrupt you. Please finish your answer. I'm sorry, Dr. Hart.

A. I was finished. I don't see the term "range map" used in that paragraph.

Q. Okay. Beyond the disclosure of Parulski, would a POSITA understand whether a range map could be used to correspond X and Y coordinates of a pixel in a first image to X and Y coordinates of a pixel in a second image?

MR. LINK: Objection. Beyond the scope.

A. I do mention that in paragraph 70 of my report.

"The term 'range map' never appears in

Parulski's disclosure of enhancing the depth of field."

And this is in reference to enhancing the depth of field. So it's -- the disclosure of enhancing the depth of field describes a flow diagram in Figure 14 that's different than the ones that were used to produce a range map. Those are in Figures 3 and 8.

And so my opinion is that it would not have been obvious to a POSITA how to modify the method shown in Figure 14 that's enhancing the depth of field to generate a -- both a range map and to autofocus the images captured by both stages.

So I believe the answer to your question is, I do not believe it would have been obvious to a POSITA to use a range map for this particular paragraph.

Q. Okay. Well, what technique would a POSITA understand to use to correspond pixels in one image to pixels in a second image?

A. Their position and their respective image.

So if you wanted a pixel at position X/Y in -- in the final image, you would have the choice between that pixel at its X/Y position in the first

image or that pixel at its X and Y position in the second image at the -- where all three Xs are equal and all three Ys are equal.

Q. To use one image to broaden the depth of field of another image, do -- would a POSITA try to compare the objects in the first and second images?

MR. LINK: Objection. Vague.

A. I'm going by what Parulski is disclosing. I did not see any disclosure of any such analysis in Parulski, leaving a POSITA to undergo the additional experimentation needed to figure out how that would be done.

Q. Okay. Well, would a POSITA understand more than what's just disclosed in Parulski?

A. Absolutely. I mean, a POSITA possesses knowledge of -- of the entire field. Parulski is -- is relying on the -- in any patent is relying on that -- that knowledge of a -- of a POSITA, but my opinions on Parulski are based on what Parulski is teaching.

Q. Okay. Well, I am asking you whether a POSITA who has read Parulski, but has the knowledge of a POSITA beyond Parulski, whether that POSITA would know how to use one image to broaden the depth of field of another.

MR. LINK: Objection. Beyond the scope. Vague.

A. I think a POSITA would look -- would read the disclosure of Parulski and attempt to implement Parulski, based on the materials provided by Parulski.

Parulski didn't describe anything beyond just the simple combination of images here.

Q. Are the two images that Parulski is talking about, are those captured at different focal lengths?

MR. LINK: Objection. Vague.

A. This paragraph states that they are captured at -- at two focus positions, the first -- the primary capture unit at one focus position and the secondary image capture unit at another focus position.

Q. Okay. How would a POSITA go about combining images taken at two different focus positions?

MR. LINK: Objection. Beyond the scope.

A. The plain and ordinary meaning of -- in this context, of the "two images are combined into a modified image," the POSITA would understand that to mean that, in the final image, a pixel at position

X/Y could use either the -- a pixel at that same position in the first image or a pixel at that same position in the second image, that position meaning having the identical X and Y coordinates.

Q. Okay. But if two images are captured at two different focal lengths or focal positions, wouldn't the object in those two respective images appear to be different sizes in the resulting images?

MR. LINK: Objection. Vague.

(Witness reviewing document.)

A. I don't see specific mention of it, but I believe it's understood in Parulski that images can be resized. Let me see.

(Witness reviewing document.)

Yeah, I don't see a -- sitting here, I don't see the specific mention of it, but I believe a POSITA would understand that the two images could be -- one of the images could be cropped and resized to -- so that the -- that the extents of the image cover the same range in the image.

Q. Okay. But by cropping and -- so you're saying that cropping and resizing the image will allow you to map X and Y coordinates of the two images together even if the two images were

initially taken with different focal positions.

Is that what you -- is that what you're describing?

A. No. I'm stating that if you have a color image and a white image -- let me see if there's a step.

(Witness reviewing document.)

So unless I've got it -- made explicit, I think what I'm recalling sitting here from Parulski is that a person of ordinary skill in the art would be able to crop and resize the Wide-angle image to -- or would understand the portion of the Wide-angle image corresponding to a similar range in the scene of the Tele image.

Q. But -- sorry. Are you done with your answer?

A. Yes.

Q. I don't want to cut you off.

A. No. Go ahead.

Q. Even after cropping and resizing an image, a POSITA would still have to map the first and second images together to understand the relative X/Y positions for each object in the image, correct?

A. You're saying map the two images

together. What I'm describing is a process where you have two images from two different cameras with two different points of view.

A POSITA, based on the description in Parulski in that paragraph that we described -- and I lost my place in that paragraph -- in entering the combination of those two images, would have taken -- if you're doing a combination of images, you have to have, you know, the portion of the Wide angle image that is also depicted in the -- in the Tele image that's taken from a different point of view. You would -- you'd use the portion of the Wide image corresponding to that portion of that entire Tele image, the overlapping portions, and then you'd restrict that.

A POSITA would understand how an image could be cropped and resized so that those two images were two depictions of the same scene from different points of view.

And then from that, you could then, for each pixel in your final image, pick a pixel either from the Tele image, the -- yeah, the Tele image or the resized -- the cropped and resized Wide angle image at -- at that particular X/Y position.

Q. How would a POSITA figure out which

portions of the Tele image correspond to which portions of the Wide image?

A. So we're not talking about portions. I believe it would just simply be the boundaries of the image.

Q. Okay. So you mentioned cropping and resizing the Wide angle image, right?

How would a POSITA combine a Wide and Tele image if they wanted to retain the size of the Wide angle image?

A. They would need to figure out the portion of the Wide image corresponding to the bounds, the rectangular bounds, the edges of the Tele image. That would be a similar quadrilateral and Wide angle image.

And then they would proportionately move across that quadrilateral in the same coordinates, the same two-dimensional image coordinates they were using in the Tele image.

Q. So you're describing a way to map the entire Tele image to portions of the Wide image, right?

MR. LINK: Objection. Vague.

A. What I'm stating is what a POSITA would understand on reading Parulski and, in particular,

Parulski's reference to that combination of images.

And I'm -- I'm understanding what a POSITA would understand, from that disclosure, that you would walk through each and every pixel of your output image. That would have an X/Y coordinate.

And that would correspond either to the X -- and from that -- the color value you would use for that X/Y position in your output image, that would either come from that corresponding X/Y position in the Tele image or a course -- it would come from a pixel in the Wide image at those same X/Y coordinates in a quadrilateral portion of the Wide image that corresponded to the bounding rectangle of the Tele image.

Q. Okay.

A. And the X/Y position would be proportional with respect to those rectangular coordinates.

Q. Would a POSITA understand that they could use mapping as a technique to correspond the portions of the Tele image to the portions of the Wide image, as you have just described?

A. There are a variety of techniques that could have been applied. I think a POSITA would follow what is being taught by Parulski.

In that section, Parulski doesn't elaborate or point the POSITA to a more sophisticated way of performing any kind of mapping. It's simply listed as a combination. We are engineering very small parts that need to operate at a very high speed.

I believe a POSITA would follow the teachings and, you know, work with the most direct method possible. The most direct method possible would simply use those same X and Y coordinates in corresponding rectangles of both images.

Q. So when you're talking about the X and Y coordinates, are you talking about the location of the pixels or the location of the objects?

A. The location of the pixels in the image in the CCD, the captured image of the CCD.

Q. Okay.

A. The object would not have X and Y coordinates. The object would be in three dimensions. It could have X, Y, and Z coordinates.

Q. Okay.

A. But those would in a themed coordinate system out in the real world. I'm speaking specifically of the X and Y pixel locations in the Tele image and in a resampled Wide angle image or in

a course -- in a proportional quadrilateral region of the Wide angle image.

Q. Is there a particular portion of Parulski that you're thinking of when you're explaining that a POSITA reading Parulski would correlate X and Y pixel locations between the two images?

A. I don't recall seeing that specifically in Parulski. I'm not recalling -- I can't find in Parulski where that alignment happens in terms of resizing the Wide angle image, but I believe it does occur in some form or another in Parulski. And a POSITA would understand that.

Q. Would a POSITA understand that object identification would be a useful step in combining two images to broaden the depth of field of the first image?

MR. LINK: Objection. Beyond the scope.

A. Object identification would have been a -- an expensive operation. It would have required a lot of detail.

There are any number of methods that a POSITA today would have used. These methods, any of them that may have been available at the time, were not provided by Parulski. That would have greatly

increased the amount of electronics, the amount of time needed to do the computation.

And I think a POSITA would have followed what was being taught by Parulski and to simply combine the two images in the way I mentioned it.

Q. Okay. Well, I didn't ask you whether object identification would have been expensive. I asked you whether a POSITA would understand whether it would be useful in combining two images to broaden the depth of field of the first.

So setting aside whether it would be costly, can you answer whether a POSITA would understand object identification to be useful in combining two images to broaden the depth of field of the first image?

MR. LINK: Objection. Asked and answered.

A. I believe Parulski teaches that it would not have been useful by not including that in the description, by simply referring to it as the combination.

If it was useful, if Parulski thought it was useful, I believe Parulski would have included it, would have referred the POSITA to how to do that. Parulski did not do that. I believe a POSITA

would understand from reading Parulski that it was not useful.

Q. Okay. Well, we talked earlier about how a POSITA would have an understanding beyond just what Parulski teaches, right?

A. Yes. A POSITA would have an understanding beyond what is covered in the patent by Parulski.

Q. Okay. And at the relevant time period, would a POSITA have had an understanding of the technique of object identification?

A. I don't believe I offered an opinion on that. So I -- I did not need to res- -- you know, I don't recall anything in Dr. Durand's declaration suggesting that. I didn't -- I didn't provide an opinion on that.

Q. Okay. What is the relevant time period that you've been considering when you're analyzing what a POSITA would understand?

A. It would be a POSITA's understanding at the effective filing date, which was June 13, 2013.

Q. Okay. And were you a POSITA in 2013?

A. Yes, I was.

Q. Okay. Did you have an understanding about object identification as a POSITA in 2013?

MR. LINK: Objection. Beyond the scope.

A. I think a POSITA would have been aware that it was possible. I didn't provide any opinions on any of the details of a POSITA's specific understanding of object identification. I don't recall that being asked in Dr. Durand's declaration. I didn't analyze that and provide an opinion on that question.

Q. As a POSITA in 2013, did you understand that object identification would have been useful in combining two images to broaden the depth of field?

MR. LINK: Objection. Beyond the scope.

A. In reading that paragraph, the context of that paragraph, Parulski as a whole, a POSITA would have understood that a simple image combination using the X and Y coordinates in the image of the two pixels in a Tele image and a appropriate -- an appropriate portion of the Wide image would have been used. Then a POSITA would have understand that that's what Parulski was teaching.

Q. As a POSITA in 2013, were you aware of the concept of object extraction?

MR. LINK: Objection. Beyond the scope.

A. I don't recall offering an opinion or

that question being asked by Dr. Durand at the time. So I don't believe I offered an opinion on, you know, what techniques a POSITA would have understood in -- in that.

I just didn't analyze that, because it wasn't asked that. That wasn't provided by Dr. Durand. And I'd need to analyze what that understanding would have looked like in 2013. Yeah, in 2013.

Q. Okay. Well, I'm asking you now: Are you able to offer an opinion about whether a POSITA in 2013 would have been aware of the concept of object extraction?

MR. LINK: Objection. Beyond the scope.

A. I believe I'm offering opinions based on this IPR, the declaration of Dr. Durand. That was not one of the questions ask -- asked. And so I would need time to analyze that to -- to be able to answer that in the detail I've provided for my opinions in response to Dr. Durand's declaration.

Q. What else would you need to look at to determine whether a POSITA would have understood in 2013 the concept of object extraction?

A. I'd need to respond to a particular opinion from Dr. Durand to that effect. And the

details of that opinion would provide the basis for my response to that opinion.

I can't respond to an opinion from Dr. Durand if he hasn't made it. I wouldn't know what I would need to look at to respond to that opinion until I saw that opinion.

Q. So is your understanding of a POSITA's knowledge based on what Dr. Durand says in his declaration?

MR. LINK: Objection. Argumentative.

A. My understanding of a POSITA is as I've stated in the report. My understanding of -- or the Declaration. My understanding of the Declaration and my opinions in this Declaration are, they are in response to Dr. Durand's opinions. And -- and those are the ones that I analyzed very carefully and provided opinions on.

Q. Okay. Can you go to column 20, line 50 through 67 of Parulski?

A. What were those lines again?

Q. 50 through 65. Basically, everything after Table 1 in column 20.

A. Got you.

Q. So do you see in -- well, do you see a lettered list (a) through (e) in that portion of

Parulski?

A. Yes, I do.

Q. Okay. And do you see a teaching about object identification in lettered item (a) in that portion of the Parulski specification?

A. Yes, I do.

Q. Okay. And do you see a teaching about object extraction in lettered item (b) in column 20 of Parulski?

A. I see that:

"The range map is then used to modify the captured image signal of the output image for a variety of purposes, such as ... :

"to enable object extraction from an image by identifying the continuous boundaries of the object so it can be segmented within the image."

Q. Okay. And what date was Parulski published?

A. The date of the patent is December 28, 2010.

Q. Does the information in column 20 help you understand whether a POSITA in 2013 would understand the concept of object identification and object extraction?

A. In the context offered in column 20, sure.

Q. Can a range map be used to fuse images?

A. I don't recall if I pointed to a specific example of a range map being used to fuse images.

Q. Okay. But do you know whether a range map can be used to fuse images, whether or not you pointed to a specific example of that in your Declaration?

A. Are you --

MR. LINK: Objection. Vague. Beyond the scope.

A. Are you asking today? Are you asking when?

Q. Well, let's start with today.

A. A range map can be used today as a -- as a -- as one data item that could be used in an algorithm for combining images.

Q. Okay. In 2013, would a POSITA have understood that a range map could be used to fuse images?

A. I don't recall if that question was asked by Dr. Durand or if I responded specifically to that question in my Declaration. I don't -- I'd

have to see the specific example to know what I was discussing to be able to answer that question.

Q. Well, again, we talked about what a POSITA would understand, and you have rendered opinions about what a POSITA would understand, right, at that -- in 2013?

A. (No response.)

Q. Correct?

A. Yeah. My analysis of what a POSITA would understand are in reference to the opinions and -- and the direct declarations of Dr. Durand and in my own report and with respect to these patents.

And so that requires analysis and examining the context of the questions, the systems involved. And -- and then I can look at the specifics of what a POSITA would have understood at the time.

Q. Okay. Well, given the teachings of Parulski about a range map, would a POSITA have understood that a range map could be used to fuse two images in 2013?

A. I'd have to see an example of what you're referring to as fusing two images. I'd have to see the specifics of the example that you're talking about.

Q. Do you understand what it means to fuse two images?

A. Are you referring to the term "image fusion," as used in the '479?

Q. Well, is "image fusion" a term of art in your field, Dr. Hart?

A. I think a POSITA reading '479 would understand what "image fusion" referred to, as described in the '479 patent.

Q. Okay. In the context of the '479 patent, fusion means combining pixels from two images to form an output image, right?

A. We just walked through claim constructions for elements of "image fusion." So I think we ought to be very careful about what we're referring to as "image fusion."

And so I would not offer a further claim construction of "image fusion." I think a POSITA understands when the '479 -- '479 refers to "image fusion," I think the '479 provides a -- you know, a good characterization of what that means.

Q. Okay. Which portion of the '479 specification do you think provides a good disclosure of what "image fusion" means?

A. It's described, for example, in the

bottom of column 7 in the section on "Still Mode Operation/Function."

"[I]mage processing that fuses the Wide and ... Tele images to achieve optical zoom, improve[d]" -- "improves SNR and provides Wide dynamic range" is one example where they're referring to -- where the '479 is referring to "fusion."

Q. Okay. In that portion of the '479 that you just read from, does "fusion" mean combining pixels from two images?

A. Well, when you say "combining pixels from two images," I described very carefully what "combining pixels from two images" referred to in Parulski. I don't believe that's what's being referred to as "image fusion" in the '479.

Q. Okay. With respect to Parulski, you used the word "correspond." Is that the same as "combining," in your mind?

A. It's -- it depends on the context. What I was referring to the combination in Parulski -- and I'm talking about "corresponding" -- I'm talking about the same X and Y coordinates in the image between the Tele image and a cor- -- and a corresponding quadrilateral region of the Wide angle

lens where the X and Y are proportional with respect to that rectangle -- that quadrilateral in the Wide image.

Q. Okay. Well, with respect to the '479, what does combining pixels mean?

A. Can you show me where "combining" is being used? I'd need to see the context of how "combining" was being used in the '479.

Q. Okay. In the context of column 7 that you just read, you told me that that's talking about fusion, right?

A. Yes. It refers to "image fusion."

Q. What would a POSITA understand after reading that portion of the specification about what "fusion" means in this context?

A. In that particular quote that the image fusion -- "the image processing that fuses the Wide and Tele images achieve[s]" -- "to achieve optical zoom, improve [signal-to-noise ratio] and provides [a] wide dynamic range."

So --

Q. If -- sorry. Go ahead.

A. I think it would improve optical zoom, SNR, and dynamic range.

Q. I'm not really asking you what it is

used for. I guess I'm trying to find out how -- how you would do image fusion, as taught by the '479 patent.

A. So image fusion is further elaborated in Figure 3 and the remainder of column 7 into column 8 and column 9 to discuss some of the details of -- of image fusion. There are further details on image fusion elsewhere in the -- in the patent as well.

MR. LINK: Counsel, we've been going about an hour 10, hour and 15 minutes. So when you have time for a break, that would be great.

MS. SIVINSKI: Okay.

BY MS. SIVINSKI:

Q. So you mentioned that with respect to Parulski, you were describing combined images in that context to be mapping the X/Y position of a pixel in one image to the X/Y position of a pixel in another image, right?

A. When I was speaking about Parulski, those X and Y values were identical; so the mapping would be the identity mapping.

An X/Y position in the final image would correspond to the exact same X value and Y value in the Tele image and would correspond to an X and Y value in a sub-rectangle, sub-quadrilateral of the

Wide angle image.

Q. And your position is that fusing images, as discussed in the '479 patent, requires something more than that, right?

A. Yes.

Q. But fusion, with respect to the '479 patent, requires using pixels from one image and putting those pixels into the other image, right?

MR. LINK: Objection. Vague.

A. I believe the 479 talks about an output image. So that's a third image. You're not taking pixels from one of the -- from the Tele image and placing them in the Wide image or vice versa. You're creating a -- an output image.

Q. Does the output image, as described in the '479 patent, contain pixels from both the original Wide image and the original Tele image?

A. I'm not sure what you mean by "pixel," does it contain a pixel.

What I was describing in Parulski, the -- that combination in Parulski, the pixel locations were identical. The X/Y coordinate in one corresponded to the X and Y coordinate in the Tele image or the corresponding X and Y coordinate where X and Y are equal to each other in that portion of

the Wide angle image.

I don't -- that's not the case with -- that doesn't suffice for what is described as "image fusion" in the '479. So you're using language I've used to refer to a combination in Parulski that doesn't apply using those same terms and that same context when looking at image fusion in the '479.

Q. I think you misunderstood my question if you thought I was referring to Parulski. I am talking about just image fusion, as it is taught in the '479 patent. I am not talking about Parulski.

So with that context, let me re-ask my question.

The '479 patent describes an output image, right?

A. Yes.

Q. And the output image is a combination of both the Wide image and the original Tele image or a fusion of those images, right?

A. The '479 talks about the fusion of those two images.

Q. Okay. And the fused image is the output image that we've been talking about, right?

A. Yes.

Q. Okay. That fused output image is going

to have portions of the Wide image and portions of the Tele image, right?

A. I'm not sure what you're referring to as "portions." I believe you're using the data from the Tele image and the Wide image to produce the fused output image.

Q. Okay. So you'll agree with me that if we use the word "data" -- you like that word better.

Okay. So let me re-ask my question using the word "data."

Does a fused output image, as described in the '479, have data from the Wide image and data from the Tele image?

A. So it is not a matter of personal preference on these terms. These are terms describing very specific methods in -- in the '479.

When you say "have data," the data is used to form the output image. The output image has its own data. There's -- the output image consists of data for that output image.

The input image consists of data for both the Tele image and the Wide angle image. The data that's in the Tele image and the Wide angle image is used in forming the data on the output image, but it is not like you're taking a bite here

and putting it over here. You know, the values may be different. The data values themselves may be different.

So it is not a manual operation of taking something from one location and putting it someplace else. These are computations.

So you take data at the beginning as an input to the computation. You perform the computation, and you get output data. And that output data in this case is used for the fused image.

Q. In order to generate a fused image, you need both data from a Tele image and data from a Wide image, right?

A. That's what the '479 indicates for image fusion, yes. It operates on a Wide image and a Tele image.

Q. Thank you for answering my question.

MS. SIVINSKI: Okay. I think we can take a break now. Let's go off the record.

THE VIDEOGRAPHER: The time is 11:40 a.m., and we're going off the record.

(Recess taken.)

THE VIDEOGRAPHER: The time is 12:02 p.m., and we're back on the record.

BY MS. SIVINSKI:

Q. Okay. Welcome back, Dr. Hart.

So we have been talking about what "fusion" means in the context of the '479 patent. And I want to look at a particular portion of the '479 specification in column 9, the description of Figure 5, which starts at line 39.

A. Did you say column 9?

Q. Yes.

A. Okay.

Q. And do you see the paragraph that starts describing Figure 5 at line 39?

A. Yes.

Q. Okay. Are you familiar with Figure 5 of the '479 patent?

A. Yes.

Q. Okay. So that paragraph describes, on line 47, it says:

"In registration step 506, mapping between the Wide and the Tele aligned images is performed to produce a registration map..."

Do you see that?

A. Yes, I see that.

Q. Okay. And what does it mean to have

produced a registration map?

A. A registration map would be the location -- you know, for a given image, say the Tele image, it would be the location in the -- let's -- yeah, let's -- let's do the -- from the Wide to the Tele.

So for each pixel in -- in the Wide image, for -- in a portion of the Wide image, it would tell you where that corresponding picture -- pixel was located in the Tele image.

Q. Okay. With respect to Parulski, earlier you said you were mapping the X/Y coordinates of one pixel to the X/Y coordinates of the other.

Is this the same concept or a different concept?

A. Well, the term "map" is being used in two different -- is referring to two different approaches. In Parulski, the term there is "combination" of two images. And following what Parulski is describing there, the map would simply be an identity. The X and Y coordinate of the two pixels would be identical.

And in Parulski -- let me find Parulski here. So Parulski talks about taking one of the images and cropping and up-sampling it before being

used.

And so after that cropping and up-sampling, so that the image as a whole was -- you know, the quadrilateral portion of one image was corresponding to the entirety of the other image, quadrilateral in the Wide angle image was corresponding to the entirety of the Tele image. After that cropping and up-sampling process, then the pixels would be identical if you're just simply doing a simple combining.

So -- so the map that's described in -- in the '479 is not the identity. They're talking about a registration map constructed using image rectification.

Q. So then it says further down that you -- in resampling step 508, you resampled the Tele image according to the registration map.

Do you see that?

A. Hang on a second. I'm hearing some -- hold on one second.

THE VIDEOGRAPHER: Do you want to go off the record?

THE WITNESS: Yes. Off the record.

THE VIDEOGRAPHER: The time is -- the time is 12:07 p.m., and we're going off the record.

(Recess taken.)
THE VIDEOGRAPHER: The time is 12:08 p.m., and we're back on the record.
BY MS. SIVINSKI:
Q. Okay. So the next step that this paragraph describes is resampling step 508, where you generate a resampled Tele image, right?
A. I see that -- that line, yes.
Q. And then the next step is decision step 510, right?
A. I see that step, yes.
Q. Okay. And then you have fusion step 512, right?
(Witness reviewing document.)
A. Yes, I see that step.
Q. Okay. So at line 54, column 9, the '479 patent teaches that:
"In more detail, in step 510, the re-sampled Tele image is compared with the Wide image data and if the comparison detects significant dissimilarities, an error is indicated. In this case, the Wide pixel values are chosen to be used in the output image."
Do you see that?

A. Yes, I do.
Q. Okay. What happens if an error is not detected?
(Witness reviewing document.)
A. It depends on what operation is being performed. So it would depend. It's -- it's -- that's simply stating that the Wide pixel values are being used if -- if there seems to be an error in that registration step. Then by default, it would use the Wide pixel data instead of the Tele pixel data.
Q. Okay. Well, if there's no error, then it generates a fusion image, right?
A. Right. Either way, it will generate a fusion image. It's going to use the Wide pixel values if that -- if it detects an error due to significant dissimilarities.
Q. Well, will the fusion image contain pixel values from both the Wide image and the Tele image?
A. Yes. It will use pixel values in the determination of the -- it will -- it will -- it will look at the pixel values from both images in determining the pixel values of the output image.
Q. Okay. Well, so if there's an error,

then it will use Wide pixel values in the output image, right?
A. Yes, that's what it says.
Q. Okay. But you can also generate a fused image that will contain Wide -- that uses Wide pixel values and Tele pixel -- Tele pixel values, correct?
A. Yes, that's what it says.
Q. So I want to look at a portion of your Declaration. If you will turn with me to paragraph 63. Let me know when you're there.
A. Okay. Paragraph 63.
Q. Okay. So you're talking about the range map disclosed by Parulski here, right?
A. Yes.
Q. Okay. And you say in the last sentence on page 33:
"The first three examples all involve identifying object boundaries or motion tracking of objects, which does not have anything to do with fusion, per se."
Do you see that?
A. Yes, I do.
Q. Okay. What do you mean by "per se" in paragraph 63 of your Declaration?
A. So those first three items, (a) through

(c), at the bottom of column 20, there's a list in Parulski. The first one is -- this sentence says:
"The range map is then used to modify the captured image signal or the output image for a variety of purposes, such as ... to improve object identification ... to enable object extraction ... [or] to enable motion tracking."
Those three features do not represent a combination of two images. They're operations that you would perform on a single image. You would identify an object in a single image; you would figure out the continuous boundaries of an object in a single image; you would enable motion tracking of objects within multiple images by identifying that boundary of the object between images.
And those -- motion means that the object is moving. So this would be subsequent images from a single sensor. This would not be the fusion of two images from -- taken simultaneously to do motion tracking. You're tracking the motion of something that's moving through time.
Q. Why would a POSITA want to enable object extraction?
MR. LINK: Objection. Beyond the scope.

A. I didn't render an opinion on that. I don't believe I was responding to any opinion regarding that particular question posed by Dr. Durand in his declaration.
Q. Okay. But I'm asking you now. Can you answer my question?
MR. LINK: Same objection.
A. I'm responding to the opinions in my Declaration. I don't have any additional opinions beyond that. I wasn't asked to do that in order to investigate, you know, why a POSITA would want to look at Parulski to do object identification. I'd need to sit down and analyze the same effort and time that it took to respond to Dr. Durand's opinions.
Q. Would a POSITA in 2013 be familiar with the process of object extraction?
MR. LINK: Objection. Outside the scope.
A. I believe a POSITA would be able to understand Parulski, as -- as provided here, and that would include understanding what Parulski was describing in terms of object identification, object extraction, and motion tracking.
Q. Would a POSITA in 2013 have any

additional knowledge, other than Parulski's disclosure from 2007, about the concept of object extraction?
MR. LINK: Objection. Outside the scope.
A. Perhaps. I didn't do an analysis of a POSITA's knowledge of object identification, object extraction, or motion tracking. For these purposes, I focused my analysis on the opinions of Dr. Durand and his declaration, and they didn't really dive into that question.
Q. Okay. Would a POSITA in 2013 -- well, let me rephrase that question.
Would you agree with me that producing a range map was a well-known technique in the art in 2013?
A. What was the -- I'm sorry. What was -- was there a question there? I didn't parse that as a question.
Q. Would you agree with me that producing a range map was a well-known technique in the art in 2013?
A. I believe so. I think it would be in the background information of both patents, but I believe so.

Q. Okay. Well, let's look specifically at column 19 of Parulski at line 53. It says:
"Methods to produce a rangemap are well known to those skilled in the art...."
Do you see that?
A. Yep.
Q. Do you agree with that?
A. Yep.
Q. And Parulski is from 2007, right?
A. Well, it's published in 2010. I guess it was filed in 2007.
Q. If Parulski is stating that methods to produce a range map are well known to those skilled in the art in 2007, would you also agree that methods for producing a range map are well known to those skilled in the art in 2013?
A. I believe that methods to produce a range map would be well known to one skilled in the art in 2013.
Q. Okay. Thank you.
So let's look at paragraph 70 of your Declaration, which is on page 38.
A. Okay.
Q. Let me know when you're there.
And the last sentence in paragraph 70

says:
"It would not be obvious to a POSITA how to modify the method shown in Figure 14 to generate both a range map and to autofocus the images captured by both stages."
Do you see that?
A. Yes, I do.
Q. Do you agree with me that there is no citation after that sentence in your Declaration?
A. Well, that sentence is preceded with a sentence stating that:
"The term 'range map' never appears in Parulski's disclosure of enhancing the depth of field at [column] 22...."
So there's a citation there.
And this statement that "it would not be obvious to a POSITA how to modify the method shown in Figure 14 to generate both a range map and to autofocus the images captured by both stages," that does not contain a citation because it's not in Parulski.
Parulski does not provide something for me to cite that shows how -- how to modify the method shown in Figure 14 to generate both a range map and to autofocus the images.

Q. Okay. So let's -- okay. What are you basing your conclusion on in that sentence?
A. Parulski and how a POSITA would read and understand Parulski.
Q. Okay. And are you concluding -- I'm sorry.
Are you opining about what a POSITA would know after reading Parulski in 2013?
A. Yes.
Q. Okay.
A. All of my references to a POSITA are with reference to the -- to the priority date of the '479.
Q. Okay. So let's go back to column 19 of Parulski. Let me know when you're there.
A. Okay. I have column 19.
Q. And the last paragraph of that column, we have discussed already. It starts with "Figure 11."
Do you see that?
A. Yes, I do.
Q. Does this portion of the specification talk about generating a range map in the context of autofocus images?
A. Well, that paragraph extends into column

20. I don't believe autofocus is mentioned in this paragraph. This paragraph is referring to Figure 11.
Q. Right. So at the top of column 20; it says:
"Referring now to Figure 11, in block 440, a first autofocus image is captured with the lower focal length image capture stage. And, in block 442, the autofocus image from the image capture stage in the lower zoom position is cropped and unsampled..."
And then it continues.
Do you see that.
A. Yes, I do.
Q. So Parulski is discussing the use of a range map in the context of autofocus images, right?
A. No.
Q. So would you agree with me that Parulski is discussing Figure 11 in the context of autofocus images?
(Witness reviewing document.)
A. Have to be careful about references with autofocusing. So that sentence in paragraph 70, I say:
"It would not be obvious to a POSITA

how to modify the method shown in Figure 14 to generate both a range map and to autofocus the images captured [at] both stages."
And that's after the -- you know, preceding that, in that same paragraph, I say:
"[The] disclosure of enhancing the depth of field describes a different flow diagram (Figure 14) than the ones capable of producing a range map (Figures 3 and 8)."
So there I'm discussing a range map. And it's "not obvious to a POSITA how to modify the method shown in Figure 14 to generate both a range map," as shown in Figures 3 and 8, "and to autofocus the images captured at both stages."
In Figure 11 that this paragraph is referring to, it's talking about autofocusing, and then it's producing a map showing the distances to different portions of the images, but it doesn't say how that autofocus is being determined.
Q. I want you to listen to my question, because I did not ask that.
Figure 11 teaches capturing autofocus images?
A. Yes. Box 440 and 448 capture a pair of autofocus images.

Q. Okay. And then step 484 teaches producing a range map, right?
A. Yes.
Q. So what specifically would a POSITA need to know in order to modify Figure 14 to use a range map?
(Witness reviewing document.)
A. So Figure 14 does not disclose a range map. So it's unclear where in Figure 14 in this -- in this invention that Parulski is very carefully diagramming for us in Figure 14, where is the construction of the range map.
Q. Okay. But you say in your Declaration that a POSITA wouldn't know how to use a range map in the context of autofocus images, right?
That's the specific portion of Figure 14 that you think a POSITA would not understand in -- with respect to a range map?
A. So let's see. Figure 11, box 440 and 448 are capturing autofocus images.
In Figure 11, you know, 504 and 524 are capturing images for autofocus.
And then Figure 11, there's a step that lowers the -- that crops and up-samples one image so it could be used with the other image.

And then the two paths merge. And we correlate and we convert pixel offsets to distances and produce the range map.

Where does that occur in Figure 14?

Q. My question to you, sir, is: What else would a POSITA need to know in order to understand where you could insert the step of producing a range map in Figure 14?

A. One thing a POSITA would need to -- a POSITA would need to know is, where does it go?

Do I do this before? Do I do this while I'm zooming? Is it going to eat up battery life constructing a range map every time I'm zooming, or is it happening after the -- you know, after I've clicked?

How do I recompute if the zoom position is greater than or less than X?

Does it happen before or after steps 504/524, 506/526, 510/530, 512/532, 514/534?

Is it pre-computed somehow?

Can I use the same range map if -- if I let go of the button and then rehit it again?

Q. Wouldn't a POSITA consider all of the steps of Figure 14 and their knowledge of how zooming works and battery life works and be able to

figure out where in those steps you could best place creating a range map?

A. Well, Parulski doesn't teach any of -- any -- anything there that would help the -- the POSITA understand how to do that.

I think it would require extensive further investigation, experimentation. I think, you know, that's what gives you a new invention, such as the '479.

Q. Okay. So we -- but you agree with me that range mapping was well known at the time of Parulski, right?

A. The concept of a range map and -- yeah, and creating a range map was well known at the time of Parulski.

Q. Okay. And a POSITA's knowledge in 2013 is not limited to what is taught in Parulski, correct?

A. Correct.

Q. Okay. But it is your opinion that a POSITA would not understand where to place the range map in Figure 14 so as to not use up bandwidth?

MR. LINK: Objection. Misstates the testimony.

(Witness reviewing document.)

A. I was just looking at the criteria for obviousness.

My -- my opinions are in response to Dr. Durand's opinions. And Dr. Durand suggests, you know, that -- that these things would have been obvious. I think they would have -- what you described there, for example, would have required extensive further experimentation for a POSITA to determine what would be suitable for, for example, the mobile phone deployment, as -- as described in Parulski.

Parulski did not provide any advice on how to do all of these things simultaneously. He was very careful in showing embodiments that focused on -- on specific things, and that combination was just not one of the many embodiments that Parulski provided.

Parulski is not teaching that. I think my understanding of a POSITA in 2013 in this -- in this kind of mobile world, where you're limited on power, on computation, you're very careful about the order and, you know, trying to limit computations to where they're used most effectively.

I think a POSITA would have really benefited from that advice from Parulski. Parulski

didn't provide it. I think the POSITA would have had to do significant experimentation to find out how to incorporate the range map into Figure 14.

Q. Okay. Well, in order to create a range map of two images, you would create the range map after you capture the two images, right?

A. That's right. You would need two images to create the range map.

Q. Okay. So that --

A. The POSITA would have understood that.

Q. Okay. So then in step, for example, 510 and 512, you are capturing two images, right?

A. In Figure 14?

Q. Yes.

A. Steps 510 and 512?

Q. Yes.

A. Okay. Yes.

Q. Okay. Could a POSITA have tried inserting the step of creating a range map after capturing those two images?

A. I didn't create an opinion on that. I think that that would have been an experiment. It's possible. I don't know what the result of that would have been. I don't know how long the range map procedure takes.

Does that mean when you press the button and take your picture, you have to wait seconds for the range map to be generated?

You know, what happens in those situations, you know, depends on a lot of issues. And so I don't know when the appropriate place is. I don't think a POSITA knows -- would have known then or now where the appropriate place to compute the range map would have been in -- in the system.

Q. Okay. Well, we already agreed that it has to be after capturing the images, right?

Isn't there only one place to insert a potential range map step after capturing the two still images in steps 510 and 512?

A. Well, you're also capturing images in step 504.

Q. Okay. But if I want to generate a range map that maps together the images I took in 510 and 512, there's only one place for me to insert the range map step, right?

(Witness reviewing document.)

A. Figure 11 refers specifically to autofocus images.

Q. But I thought you said --

A. So what you're --

Q. Go ahead.

A. What you're describing doesn't -- you know, doesn't really align with Figure 11.

Q. But you said in paragraph 70 of your Declaration that it would not be obvious for a POSITA how to modify the method of generating a range map and autofocus images, but now you're saying that Figure 11 teaches generating a range map with the context of autofocus images.

So I'm unclear about what your opinion is about what a POSITA would know.

Can you clarify for me?

A. Yeah. That sentence in paragraph 70 is in reference to the preceding sentences in paragraph 70.

"The term 'range map' never appears in [the] disclosure of enhancing depth of field."

That refers to Figure 14. And that's different "than the ones capable of producing a range map (Figures 3 and 8)."

Figure 11 shows how to create a range map.

"It would not be obvious to a POSITA how to modify the method shown in Figure 14

to generate both a range map and [an] auto" -- "and to autofocus the images captured by both stages."

Figure 11 is not Figure 14.

Q. I understand that.

You understand that in the context of obviousness, the disclosures do not need to be in one figure, right?

A. I don't believe my -- any of my opinions on obviousness have required a single figure to show something.

Q. Okay. But your opinion is that because Figure 14 does not disclose the concept of a range map, a POSITA wouldn't know how to use a range map in Figure 14, right?

A. What I'm saying is that it would not be obvious to a POSITA how to modify Figure 14 to generate both a range map and to autofocus the images captured by both stages.

You offered one solution. There's multiple solutions that -- that could have done that. I think it would have required extensive experimentation in order to figure that out beyond what -- what I would consider to be obvious.

Q. Okay. Well, let's focus on the

left-hand side of Figure 14.

So in step 502, we've decided that the imposition is greater than -- is not greater than X. So we're sort of traveling down the left-hand column of this flow diagram. Okay?

A. Okay.

Q. Where are the possible places that a POSITA could insert the step of creating a range map?

MR. LINK: Objection. Beyond the scope. Incomplete hypothetical.

A. In any place. It could be inserted anyplace. We -- I don't know.

Q. Well, we've already -- we've already decided that it has to be after you capture images, right?

A. Right. And step 504, the very first step, and then step 506 -- no. I'm sorry. Step 504, the very first step after the left-hand side of the diagram you're pointing to, captures two images.

Q. Okay. So it would have to be after step 504?

A. Yes. You would need two images, and step 504 captures two images, yes.

Q. Okay. So at most, there is one, two,

three, four, five arrows in the steps succeeding step 504, right?

A. No. Because there's a loop. Is the zoom button pressed? Yes or no. If the zoom button is pressed, then you've got additional arrows from the iteration of steps 502, 504, 506, and 508.

Q. Okay. So if you assume that the zoom button is not pressed, there are one, two, three, four, five places you could insert a range map, right?

A. No. I think -- you know, these are -- it's a block diagram. This block diagram doesn't refer to range map. It's referring to enhancing the depth of field of the primary image.

And so the -- what's being disclosed in -- in steps 504, 506, 508, 510, 512, 514 refers specifically to that task. It is not referring to the use of a range map. I don't know that the integration of a range map needs to happen between these steps or is somehow included within any of these steps.

Q. What is the experimentation a POSITA would have to do to try to use -- to try to generate a range map in the method of Figure 14?

A. Parulski doesn't give me enough

information to -- to know that. That's exactly the point of paragraph 70, is that there is not enough information here for a POSITA to incorporate a range map into Figure 14, based on what Parulski provides. And in order to do so would require significant experimentation and might just result in another invention and patent.

Q. Well, my question is: What experimentation would be required?

So you're concluding that it would take undue experimentation to put a range map in the -- into Figure 14.

What experimentation would be required?

MR. LINK: Objection. Asked and answered.

A. There is no formula for this. This is -- this is why these are inventions. I can't -- I don't have an opinion that -- that goes into the specifics of what would need to be -- what would need to happen in order to incorporate a range map into Figure 14.

My opinion states that, you know, what a -- what a POSITA would need to do would be extensive and well beyond what would be considered obvious.

Q. So it would be extensive, but you're not sure what it would be, correct?

A. I was responding to Dr. Durand suggesting that it was -- that the combination of Parulski with other art made these steps obvious.

I am -- my opinion is that it would not be obvious. I didn't go into the detail of what a -- you know, I did not insert the range map into Figure 14.

I just showed that it would not be obvious. It would require significant further experimentation. I didn't -- I didn't need to give the specific steps of how one would do that. I think I successfully showed that -- you know, that is not obvious.

It's -- even sitting here now as we discuss this, we haven't figured out where it would go. I couldn't imagine a POSITA being able to do that in any form that would be considered obvious.

Q. How do you know the experimentation would be substantial or significant, to use your term, if you don't know what the experimentation involves?

A. I'm using the criteria for obviousness and the same criteria for experimentation. I've

written my own patents. I've published my own papers. I've overseen students doing the same. Each of them has, you know, contributed to the state of the art.

And I've, you know, from that experience, weighed what -- and have a good sense of, you know, which things would -- would meet the criteria for obviousness versus which would require extensive experimentation and would be beyond what I would consider to be obvious to a POSITA at the time.

Q. Would the algorithm for generating a range map be well known to a POSITA in 2013?

MR. LINK: Objection. Vague.

A. I believe I've already indicated yes. You know, constructing a range map was -- was already identified as being well known by Parulski.

Q. Okay. And the way you would implement a range map is through an algorithm, right?

A. There's any number of ways of constructing a range map. You know, I would need to see the particular platform, whether this is implemented as a program or whether it's implemented in hardware through some instructions, hard coded in RAM, fed to a processor or through some ELECTRIC --

electrical VLSI assembly.
I mean, there's any number of ways that this could be constructed.
Q. Okay. So let's specifically talk about the infinite "dog and mountain" example that Parulski discloses.
A. Okay.
Q. Before you turn to Parulski -- sorry. That just gives you the context.
I want to look at paragraph 76 of your Declaration.
A. Okay.
Q. So if I understand you correctly, in paragraph 76, you are concluding, based on the teachings of Parulski, that the dog in the dog and mountain example would be in focus, correct?
A. Yes.
Q. Doesn't Parulski specifically teach that the dog is not in focus in that example?
(Witness reviewing document.)
A. Where does it say that the dog is not in focus?
Q. So line 14 and 15 on column 21 says: "The black dog is too dark (underexposed) and out of focus."

(Witness reviewing document.)
A. Okay. So the dog could be out of focus.
Q. Does that change your opinion in this section of your Declaration describing the dog and mountain example?
A. No. You could still obtain this using image -- image data from the Wide image.
It later says that "the range data can be used to isolate the mountains and the flowers, which can then be blurred, and further isolate the dog, which is sharpened to obtain a nice sharp image."
So I believe the range data is giving you the distance to objects, but if, for example, the dog is blurry, you just sharpen the dog image. You only need the dog -- a blurry dog image to sharpen a single image.
Q. Why do you need the range map to use just the Wide image data to sharpen the portion of the dog?
A. So the range data is used to isolate the mountains and the flowers and to further isolate the dog. So you would use the range data to isolate these portions of the image. I believe that was described earlier.

"As mentioned earlier, the range map is then used to modify the captured image signal or the output image for ... object identification ... [or] object extraction."
Q. Okay. So speaking of object extraction, I think you said earlier that object extraction -- well, would object extraction ever be used in autofocusing?
MR. LINK: Objection. Beyond the scope.
A. I don't recall seeing that in Dr. Durand's opinions. I don't think I provide an opinion on that particular issue.
Q. So I want to go back to the dog and mountain example.
Does the fact that the Wide image captures the dog out of focus -- you said that does not change your opinion, right?
A. That's right.
Q. Okay. Let's move on to something that, hopefully, will be a little quick, and then we can take a longer break for lunch.
Okay. What is image rectification?
A. I believe image rectification is referred to quite a bit in the '479 patent. It is -- when you rectify two images, you're finding a

correspondence -- a pixel-by-pixel correspondence corresponding to the objects intended to correspond to the same points on the objects depicted in the scenes.
Q. Would a POSITA have understood how to rectify images in 2013?
A. Yes. Let me also say that it's an expensive process. It involves, you know, a significant amount of computation.
Q. What are the benefits of image rectification?
MR. LINK: Objection. Outside the scope.
A. The '479 patent describes several of the benefits. I think I alluded them -- to them earlier in discussing image fusion.
Q. Is there a specific portion that you're referring to?
A. Sorry. You're breaking up. My connection might not have been -- what was the question?
Q. So you said that the '479 patent describes several benefits of image rectification. And I was wondering if you could elaborate on that for me, either by pointing me to a portion of the

specification or listing those benefits.
A. So column 7, lines around 57 through 59: "Image processing that fuses the Wide and Tele images to achieve optical zoom, improve signal to noise ratio, and provides Wide dynamic range."
Those are three of the benefits.
Q. And are those the benefits of image rectification?
A. Image rectification is part of the image fusion process described by the '479, and -- and those are the resulting benefits of that process.
Q. Okay. Anything else you had in mind about benefits that the '479 lists about image rectification?
A. Let me see if there's an exhaustive list. I don't think I have an exhaustive list of all the benefits of the '479. Let's see.
Q. Well, I'm talking specifically about the benefits of image rectification.
A. I just gave -- I gave some examples. Were those not sufficient? I mean, I don't -- I didn't create an exhaustive list of all the benefits of image rectification.
Q. Okay. Well, do you know any more off the top of your head that you could give me?

A. No. I think I'm, you know, speaking in reference to my opinions and my Declaration, responding to Professor Durand's -- Dr. Durand's declaration. So I don't recall off the top of my head any addition -- additional that were needed.
Q. I'm not asking you about what Dr. Durand said or about specific things you listed in your Declaration.
I'm asking you: As a POSITA and as an expert in this case, what are the benefits of image rectification?
Do you have any others to list, other than what you pointed to in column 7 of the '479 patent?
MR. LINK: Objection. Asked and answered.
A. There are -- there are many numerous benefits of rectification used in a wide variety of situations.
My opinions here are in response to Dr. Durand's opinions on the IPR provided. And the ones I've listed so far, to what I can tell, suffice to indicate the benefit of image rectification, as specified concisely by that sentence in the '479 patent.

Q. Would you agree that image rectification makes calculations associated with stereo algorithms considerably simplified?
A. Image rectification can be used for stereo algorithms as one of -- one of the steps. And when it is used, it makes some of the subsequent steps easier.
Q. Okay. Would you agree that image rectification makes the pixel matching algorithm more efficient?
A. So when you do image rectification, the subsequent registration map can follow a single scan line search instead of searching throughout the image. So it does make that step easier when you're using rectification in that particular algorithm for stereo.
Q. Would you agree that image rectification is particularly beneficial when the two cameras capturing those images that you're going to rectify are positioned next to one another?
MR. LINK: Objection. Incomplete hypothetical.
A. I don't know that I had to look at that question in response to Dr. Durand's opinions. I don't know that I offered an opinion on whether it

was beneficial.
I do know that even -- even when two cameras are close to each other, they -- the alignment is often not sufficient to avoid rectification. And a POSITA would have understood that in 2013.
Q. I'm not sure I understood your answer. Sorry. Just to make sure I -- let me try to rephrase it, and you tell me if I got it right or not.
Can you use image rectification to rectify two images captured with cameras that are next to each other?
A. That's a different question. And you can use rectification to rectify two images even if those two images are captured from cameras placed next to each other.
(Exhibit APPL 1013 introduced.)
BY MS. SIVINSKI:
Q. So I want to look at the Szeliski reference. Are you familiar with that?
A. Yes, I am.
Q. Let me know when you have it available to you.
A. Okay. I'm downloading.

Okay. And I have it.
Q. I'm looking at page 11 of that PDF under the heading "11.1.1 Rectification."
A. Okay.
Q. Okay. And I'm looking at the second paragraph under that heading that starts with:
"A more efficient algorithm can be obtained by first rectifying ... the input images so that corresponding horizontal scanlines are epipolar lines...."
Do you see that sentence?
A. Yes.
Q. Do you agree with that teaching?
A. So it's more efficient than what Dr. Szeliski is referring to in the preceding paragraph.
Q. Which is what?
A. "A more general correspondence algorithm, such as optical flow."
Q. Okay. So when you're -- when you're using a correspondence algorithm, you can make that algorithm more efficient by first rectifying the images, right?
A. More efficient than optical flow, yes.
Q. Okay. And then there's a footnote 2

after that sentence. Do you see that?
A. Yes.
Q. And that teaches that image rectification "makes the most sense if the cameras are next to each other."
Do you see that?
A. I see that that sentence begins with those words, yes.
Q. Well, feel free to read the rest of the sentence if you would like to for context.
Do you agree with that statement in Szeliski?
MR. LINK: Objection. Vague.
A. I agree with the entire sentence in Szeliski, saying that you can rectify any two images as long as they're not merged too much or have too much of a scale change.
Q. Okay. Could image rectification be used to correct for differences in the perspective or POV between an image captured by a Wide lens and a Tele lens?
MR. LINK: Objection. Compound. Vague.
A. So the '479 patent describes an image fusion process that relies on rectification and registration in order to, for example, output a

fused image with the point of view of the Wide camera by mapping Tele image pixels to matching pixels within the Wide image.
Q. So you mentioned in paragraph 82 of your Declaration an alternative or what you consider an alternative to range mapping.
Well, let me strike that question and start over.
Paragraph 82 of your Declaration says that there are alternatives to rectification.
Do you see that?
(Witness reviewing document.)
A. I don't see that specific sentence.
Q. Okay.
A. Is it paragraph 82?
Q. Yeah. I'm looking at the very bottom of -- of page 44. So it's the end of the first sentence of that paragraph.
You say that Dr. Durand "provides no reason why a POSITA would use rectification over other alternatives."
A. Yes.
Q. Do you see that?
A. Yes.
Q. Okay. What other alternatives are you

thinking about in that paragraph?
A. The rest of the paragraph discusses, for example, plane sweep.
Q. And what is plane sweep?
A. It's an alternative to pre-rectifying the images before matching. It's described in the next section of Szeliski.
Q. Okay. Are there advantages of rectification over plane sweep?
A. I think the reason that Szeliski includes both algorithms is that both have certain advantages and disadvantages when compared to the other. If one was clearly better than the other, Szeliski would have left the one that had no advantages out of the book.
Q. Okay. How would a POSITA know whether to use rectification or plane sweep in a particular context?
A. That's exactly my point of -- of paragraph 82. Dr. Durand is suggesting that a POSITA would have known that you would follow Szeliski's rectification method in combination with Parulski. And I'm suggesting that, you know, that's ignoring the existence of plane sweep, and -- and it would not have been an obvious choice.

Q. Could a POSITA have tried using rectification in a system and then also try using plane sweep in a system and see which one worked better?

A. That -- that describes experimentation. And, you know, that's a significant level of experimentation beyond what I would expect to be obvious.

Q. Okay. Well, is it possible, is my question.

Would it be possible for a POSITA to try using rectification in a system and then also try using plane sweep in a system and see which one works better?

A. I didn't offer an opinion on what would be possible for a POSITA. I offered an opinion on what would be obvious to a POSITA. And it would not have been obvious to a POSITA to use rectification versus plane sweep for these cases.

Q. Yeah. Okay.

So I understand what your Declaration says, but I'm asking you the question now.

So can you provide me an answer to my question now about whether it is possible for a POSITA to try using rectification in a system and

also try using plane sweep in a system and see which one works better?

A. I believe I answered that before also. It's certainly possible, but would require significant experimentation.

Q. Okay. What experimentation would it require?

A. It would require an implementation of rectification; it would require an implementation of plane sweep; it would require an analysis of the use cases; you'd have to determine where they were being applied; you'd have to look at if there's any benefits to the fact that multiple rectifications may be happening, you know, in sequence.

There's a large number of variables here that would need to be considered and determined, including the platform that you would be evaluating these on and the characteristic of the data you'd be looking at.

Q. You agree with me that a POSITA would have known about how to implement image rectification, right?

A. A POSITA would have known about implementing rectification or plane sweep, based on the algorithms provided by -- by the Szeliski

reference.

MS. SIVINSKI: Okay. I think now makes sense to take a longer break for lunch. So let's go off the record.

THE VIDEOGRAPHER: The time is 1:08 p.m., and we're going off the record.

(Lunch recess taken.)

---o0o---

AFTERNOON SESSION

(Time noted: 2:14 p.m.)

THE VIDEOGRAPHER: The time is 2:14 p.m., and we're back on the record.

JOHN C. HART, Ph.D.

resumed as a witness and testified further as follows:

CONTINUED EXAMINATION

BY MS. SIVINSKI:

Q. Hi, Dr. Hart. Welcome back.

A. Hello.

Q. Before we get started with the questions, I just wanted to note for the record that my colleague Priya is not going to rejoin the deposition after the lunch hour, because we will be talking about confidential business information.

So out of an abundance of caution, she's going to not rejoin. So, hopefully, that takes care of our confidentiality concerns that we addressed this morning.

MR. LINK: Stephanie, in view of that, let's have the transcripts be marked confidential. That way, we can -- I mean, we can talk then about what parts are confidential and what aren't, but at

least initially, that way, they don't inadvertently get sent to somebody that they shouldn't.

MS. SIVINSKI: That's fine with me.

BY MS. SIVINSKI:

Q. Okay. So I want to focus on one last item from the 905 IPR, which is your opinions about the Stein reference.

Are you familiar with the Stein reference, Dr. Hart?

A. Yes. I believe it was one of the references used in the Declaration.

Q. Yes. And let me -- I will add it into the chat so you have it if you would like to take a look at it.

A. Thank you.

(Exhibit APPL 1023 introduced.)

BY MS. SIVINSKI:

Q. So I would like to talk about the camera or the lens assembly of cameras that Stein teaches.

Stein teaches a camera with two lenses, right?

A. Let me bring that up.

(Witness reviewing document.)

Q. And if it's helpful, Dr. Hart, you can look at the abstract. I can point you specifically

to the first sentence, which says --

A. I saw two -- I saw two images.

Q. Okay. So let me rephrase my question and --

A. And we include the second image capture device. Yes. Okay.

Q. Okay. So the first sentence of the abstract to Stein states:

"An imaging system for a vehicle may include a first image capture device having a first field of view and configured to acquire a first image relative to a scene associated with the vehicle, the first image being acquired as a first series of image scan lines captured using a rolling shutter."

Do you see that?

A. Yes. Yes, I do.

Q. All right. And then the second sentence of the abstract says:

"The imaging system may also include a second image capture device having a second field of view different from the first field of view."

A. Yes. And so it was the May -- I recall Stein dealing with the rolling shutter and movement.

So it would depend on how we're using Stein, whether that relies on the -- a second camera being necessary or not.

Q. Okay. Well, you would agree with me that Stein discloses that you can use an imaging system with a first image capture device and a second image capture device, right?

A. Yes. That's correct.

Q. Okay. And it discloses that the first image capture device can have a first field of view and the second image capture device can have a second field of view, right?

A. Yes.

Q. And would you agree that Stein teaches one or that -- well, that one image capture device has a longer focal -- focal length than the other?

A. Let me take a look.

Q. And, specifically, you can look at Figure 2A of Stein, if that's helpful.

A. Okay. Let me take a look.

Yeah, yeah. It looks like at the bottom of column 7:

"In some embodiments, image capture devices 110 and 120 may be asymmetric."

They may have different fields of view

and different focal lengths.

Q. Okay. I think you just mentioned this, but just for an abundance of clarity, I guess, would you agree that Stein teaches two image capture devices that can have different fields of view?

A. Yes. That's in that same portion at the bottom of column 7.

Q. And Stein discloses two image capture devices that have -- that have different fields of view, but that those different fields of view are overlapping, right?

A. Yes.

Q. And Stein discloses the use of CMOS censors, right?

A. Yes.

Q. Okay.

A. It includes CCD sensors or CMOS sensors.

Q. So in terms of the image capture device itself, are there any differences between the image capture device Stein discloses and the image capture device that Parulski discloses?

(Witness reviewing document.)

A. Let me take a look at Parulski. My opinions were -- were on the need to combine. Let me see if...

(Witness reviewing document.)
So I think Parulski preferred CCD, but other sensors, such as CMOS sensors, could be used equally well without limitation, according to the invention.
Q. Okay.
A. So there's a preference away from CMOS, but CMOS could work for Parulski.
Q. Okay. Any other differences that you can ascertain, sitting here today, between the image capture devices disclosed by Stein and the image capture devices disclosed by Parulski?
A. Well, the --
MR. LINK: Objection. Outside the scope.
A. They were designed for completely different purposes.
Q. Okay. But in terms of the sensors and the lenses themselves, do you -- can you name any differences between the image capture devices in those two references?
A. I didn't --
MR. LINK: Objection. Asked and answered.
A. Yeah. I didn't analyze it any deeper

than -- than that. I did provide opinions that you wouldn't combine Parulski with Stein. And that was mostly motivated by the differences in purposes and designs of the two systems, how they're deployed, whether the camera is going to be moving or not.
And so those -- those differences were significant and didn't require me to look at specific differences between the -- the systems themselves --
Q. Okay. So --
A. -- whether the cameras were -- the camera CMOS sensor and other specific devices used in the embodiments were significantly different or not.
Q. Okay. So your understanding -- your testimony is that you did not need to look at any technical differences between the image capture devices in those two references to render your opinion; is that right?
A. My opinion is that it would not have been -- a POSITA would not have needed to be motivated to seek the synchronization offered by Stein that motivated Dr. Durand to consider that combination because of the different purposes between Parulski and Stein.

Stein was disclosing an invention for moving cameras, cameras inside a moving vehicle, and Parulski disclosed sensors for a camera. And Parulski's usage case was a still camera taking still images.
And Parulski's -- I mean -- yeah, Parulski's case was a still camera taking still images. And in Stein's case, the camera would be in motion.
Q. Okay. Could Parulski's camera be used to capture motion, such as at a sporting event?
MR. LINK: Objection. Incomplete hypothetical.
A. I mean, Parulski captured video -- discussed capturing video, but the -- the usage cases, you know, focused on, you know, a shutter. And so it was -- you know, those -- depressing the shutter and capturing an image was, you know, exemplified in Parulski using still image sequences, but Parulski does include video.
And so that video could include, for example, a sporting event where you were filming in the stands some sporting event that was happening and had motion.
Q. Okay. But you could also use Parulski's

camera to capture images, not video, but still images, of something like a sporting event, which involves motion, right?
A. Well, I mean, there's motion at some level constantly. There was -- I mean, that distinction didn't seem to be made in Parulski.
Parulski -- if you're taking a signal image, then Parulski would capture that image whether or not the objects in that image were moving or still.
Q. So I want to make sure that I understand your previous answer.
I -- I appreciate the fact that your Declaration analyzes the different use cases between these two references, but I understood you to say that your Declaration does not provide an opinion about any technical differences between Parulski and Stein; is that right?
MR. LINK: Objection. Mischaracterizes testimony.
A. That's not my opinion. My opinion is that the combination would not have been motivated. And the primary reason that that combination would not have been motivated -- a POSITA looking at Parulski, for example, would not have been motivated

to look at Stein was because of the use case.
There -- there is other reasons as well, but the -- the main ones that I outlined in my opinion were that -- were that usage case, the fact of whether or not the camera was in motion or not, and the special attention Stein had to devote to a moving camera.
Q. Okay. I don't think you're answering my question. So let me try to rephrase it and see if -- and we can try again.
A. Okay.
Q. Can you point me in your Declaration to any portion where you analyzed similarities or differences between the image capture devices disclosed in Stein and the image capture devices disclosed in Parulski?
A. So, I mean, I did analyze the camera system of Stein. Paragraph 88 talks about the rolling shutters and the need for synchronization of those rolling shutters. I found that provided significant differences in design from Parulski.
Q. Okay. So other than the rolling shutters, can you point me to any other portion of your Declaration that compares the image capture devices disclosed in Stein and Parulski?

A. Off the top of my head, no. I think I primarily look at Stein in those paragraphs, 86, 87, 88. I don't know that I looked at Stein for anything else.
Yeah. I believe it's just those three paragraphs, sitting here, just looking at my report.
Q. Thank you.
You have mentioned a few times that Stein's use case involves motion. Can you expand on why that is relevant to your opinions in these IPRs?
A. Yes. Anybody who's taken a picture with a camera with a rolling shutter knows that if you move the camera while you're taking that picture, the rolling shutter is -- is not seeing the image projected on the sensor all at once.
It's seeing -- it's basically running a scan line through. That's the rolling shutter portion of it.
And so, you know, when the scan line starts, it's seeing the image being projected at the beginning of a time. And then, later on, it is seeing the image at a subsequent point in time. And so you get a distorted image if the image is moving.
If you're using an image device for photography, that can be very -- that can produce a

distorted photograph.
If you're using your image device for some other feat -- some other purpose, other than creating photographs for other people to look at, then you can accommodate that, because you know that that effect is happening.
And especially when you're using sensors for, you know, vehicle cameras for driving assistance, it doesn't matter if the image is distorted so long as you know the image is distorted and you factor that into your analysis, which is what Stein was doing.
Q. Does Stein teach any benefits for image processing, like matching objects within the images?
MR. LINK: Objection. Beyond the scope.
A. So Stein, you know, teaches that multiple vehicle cameras have to register past moving scenes. So it's important that the rolling shutters are synchronized, because a fast-moving scene would need synchronous shutters to -- to make sure it was looking at corresponding pixels in those two images coming up -- coming at them at the exact same time.
Q. How does that relate to matching objects within the images?

A. I mean, my summary that was used for this opinion didn't go into those details of what that matching was doing, but that these two cameras had to register fast-moving scenes.
So that registration of fast-moving scenes means that there's some registration happening, but those resulting images aren't provided for human viewing. And so those rolling -- rolling shutter artifacts don't need to be corrected. They just need to be accounted for in the analysis.
Q. So in looking at paragraph 86, 87, and 88 of your Declaration, there aren't any citations to specific portions of Parulski or Stein, right?
A. I don't -- I don't see any, no.
Q. So what are your opinions based on in these sections -- or in these paragraphs? Sorry. Paragraph 86, 87, and 88.
A. I read the -- I read the --
Q. Sorry.
A. I read the entirety of Parulski; I read the entirety of Stein; I looked at all of the embodiments and the invention and what was disclosed.
And it was clear in determining whether

a POSITA would be motivated, after looking at Parulski, to then look at Stein, that that motivation would not be there. It did not exist. The POSITA would not be motivated to look to Stein after looking at Parulski.

And that was largely because of those differences in the use case. The rolling shutters and the synchronization of rolling shutters was entirely, you know, part of a different system of a -- of a fast-moving camera with a fast-moving scene that just wasn't the situation with Parulski.

Parulski was able to synchronize the shutters for a completely different reason, just to facilitate reduced -- to avoid the need for the processing of the image so that both cameras were at the same point in the same image, so that -- so that they could produce the same segment of the image at the same time for Parulski's analysis.

Q. Okay. I have a few questions about the Soga reference -- or the portion of your Declaration that discusses Soga. So let's look at paragraph 97 of your Declaration.

A. Okay.

Q. And I guess, more precisely, I should say, we should look at the section of your

Declaration that begins with paragraph 97.

So if I understand the heading right, your -- of that section, your conclusion is that Apple has not shown that a particular claim limitation is satisfied with this combination under the claim limitation's proper construction.

And that claim limitation is "to find translations between matching points in the images, to calculate depth information, and to create a fused image suited for portrait photos," right?

A. Yeah. That Section 2 title is, as it is in my report, that Apple has not shown that limitation is satisfied under the construction I used, as described in the claim construction section for that term.

Q. Have you done any analysis about whether the claim limitation is met under Apple's construction of that term?

A. I did not agree with Apple's construction. I explained why in the claim construction section. And so I -- I performed my analysis under a plain and ordinary meaning for that ter as I would expect a POSITA to understand it.

And so if -- later on, if, you know, a different construction is provided, then I would

want to amend my opinions, based on that -- on that new information.

Q. So we talked a little bit about -- well, not a little. We talked a lot about range mapping today, right?

A. Yes.

Q. In the context of developing a range map or creating a range map, I think we used the term "depth" and "distance" today. And I want to make sure I understand how those fit together.

So in the context of a range map, does "depth" mean distance from the camera to objects in the image?

A. Which range map are we discussing?

Q. Well, I don't have a particular range map in mind. Did that question require us to look at a specific range map?

A. Yep.

Q. Does the definition of "depth" change, depending on which range map we're looking at?

A. I don't know what units of depth you're -- you're -- you're determining; where the range maps came from, the context.

The '479, you know, discusses this. The -- and Parulski discusses this. I believe Parulski

has a table that it forms in order to, you know, determine autofocusing, based on range data.

And so, you know, that -- that table is -- is carefully constructed in Parulski in order to make that connection between depth and distance, based on range data.

Q. Well, what is the connection between depth and distance?

MR. LINK: Objection. Vague.

A. I mean, there are several columns of Parulski devoted to that to answer that question.

Q. Can you determine the distance between the camera and an object using range, a range map?

A. So Parulski gives you Table 1. That's a table based on distance in feet or distance in millimeters and offset in pixels. That gives you an example of, you know, how you would make these determinations.

It offers -- Parulski offers two different algorithms for making these. one is an optimization algorithm, based on hill climbing. It's a very involved process to figure out what distance corresponds to a certain offset in pixels.

Q. So I'm not -- let me ask my question again, because you did not answer it.

Can you determine the distance from the camera to an image -- to an object in the image using a range map?

MR. LINK: Objection. Asked and answered.

A. The answer is yes. Parulski was able to do that, as shown, for example, using Table 1.

Q. Okay. Thank you.

Okay. Now let's talk about your secondary considerations analysis, which begins on page 60 of your Declaration, paragraph 114.

And are you familiar with the concept of nexus in the secondary considerations context?

A. Yes.

Q. Okay. What is your understanding about what nexus is required?

MR. LINK: Objection to the extent it calls for a legal conclusion.

(Witness reviewing document.)

A. So I'm not a lawyer. At a very high level, the nexus is a connection.

Q. Between what?

A. For example, I saw that there is evidence of a nexus between the industry praise and the invention of the '479 patent.

So the nexus would be a connection between what I'm listing as the secondary considerations and the invention, the elements of the '479 that -- that are under consideration.

Q. Okay. So does the nexus -- as you're applying it in your opinion, is the nexus between the secondary consideration and the patent or the secondary consideration and a particular claim of the patent?

A. I believe I'm showing it with the invention. I believe it's with respect to the invention, as described in the claims.

Q. So do you have -- have you rendered an opinion in your Declaration about whether there is a nexus between the secondary consideration evidence you present and any particular claim of the '479 patent?

A. I mean, my opinions don't describe a specific claim. I believe it's just referring to the invention.

Q. So you mentioned several communications that happened between Apple and Corephotonics.

You were not a participant in any of those conversations, correct?

A. That's correct. I've seen -- I've seen

evidence from those conversations, but I was not in attendance at any of those conversations.

Q. Okay.

A. And in -- more specific to your previous question, paragraph 115, it's my understanding that such secondary considerations must have a nexus to the claimed invention to be relevant to the issue of obviousness.

So I'm looking at the claimed invention. So the invention, as described by the claims.

Q. You didn't attend any meetings between Apple and Corephotonics, correct?

A. That's correct.

Q. So you provide a bullet point list that summarizes some emails between Apple and Corephotonics.

Who selected the [redacted] that you summarized in this portion of your Declaration?

A. I've got the -- I've got all of the [redacted]. I mean, in the preparation of this report, I don't remember who picked which, but I believe I was offered some -- some highlights that would be helpful, and I think I adopted them.

Q. Okay. Were you given [redacted] to review beyond those that you summarized in your bullet

pointed list on pages 66 through 68 of your Declaration?

A. Yeah. I believe I was given complete sets, and those are -- you know, those are listed in my materials provided.

Q. Okay. So you were provided a set of [redacted]. And then you, with the help of a summary you were provided, showed some except in your Declaration, right? Is that right?

A. Right.

MR. LINK: Objection. Objection. Mischaracterizes his testimony.

Q. Okay.

A. I did -- I did have all the [redacted], and I did provide a summary in that bulleted list.

Q. Okay. So the first bullet point on page 67 of your Declaration references a [redacted] named [redacted]

Do you see that?

A. Yes.

Q. Did you review that file?

A. No, I did not.

Q. Did you ask to review that file?

A. No. I -- I understood that that file was provided, and I was able to ascertain its

contents, based on the descriptions I was given. So I didn't see any need to further examine that file.

Q. Do you know whether the [redacted] file describes a dual-aperture camera?

A. Based on that bullet, that describes the design of a [redacted] And so it's really [redacted] And that was my understanding, and that's what's documented in that bullet.

So I didn't -- I didn't look further to see if it needed to have those additional pieces. That bullet just says that the description was regarding [redacted]

Q. Do you know whether the [redacted] file meets the requirements of [redacted] described in claim 1 of the '479 patent?

(Witness reviewing document.)

A. That was my understanding upon receipt of the [redacted], but I don't believe I have an opinion stating that specifically, that equivalence, no.

Q. Do you know whether Corephotonics shared

any Zemax files relating to a Wide lens, as described in claim 1 of the '479 patent?

A. My recollection here, I don't recall. And everything that I could speak about regarding that without looking at all the [redacted] is here in my report. And I don't see any disclosure of a Wide -- Wide angle.

I think the particular challenges with the telephoto lens and the total track length with respect to the effective focal length was the -- was the real invention.

I believe, you know, that's -- that's actually explained early on -- earlier in this section.

Q. But you don't know whether the [redacted] requirements of claim 1 of the '479 patent, right?

A. Can you repeat that question?

Q. Sure. You don't know whether the [redacted] requirements of claim 1 of the '479 patent, right?

A. I certainly didn't express an opinion to that level of detail.

Q. Did you review any information about the [redacted]?

A. I did not do that, no.

Q. And did you do any analysis about whether the [redacted] requirements that are described in claim 19 of the '479 patent?

A. Oh, I did not personally do that analysis. It was my understanding that the [redacted] "has a respective effective focal length ... and total track length ... fulfilling the condition EFL-t/TFL-t is greater than 1," which is one of the main elements of the invention.

And so my understanding was that it disclosed information regarding that.

Q. So your -- have you assumed that the [redacted] file meets the limitation of effective focal length and total track length and F number described by the '479 patent?

MR. LINK: Objection. Mischaracterizes previous testimony.

A. I don't believe I mention F number in this -- in relation to that, but I do -- I do believe that that [redacted] at least satisfied the effective focal length and total track length conditions of the invention.

Q. How do you know that?

A. It's my understanding, based on the material that was given to me.

Q. Okay. Which particular material is that understanding based on?

A. The emails that were provided to me, the corresponding reports by the head of Corephotonics, and all the other materials I used to create these opinions.

Q. But you have not seen any data about the effective focal length or total track length of the [redacted], right?

A. As I -- as I mentioned before, I did not examine the details of that file to determine its specific contents.

Q. And you haven't seen any data from another source, other than the [redacted], about what the effective focal length and total track length of that lens design would have been, correct?

A. I don't -- I don't recall the entirety of Dr. Moore's declaration. So I don't recall if he examined that or not. I certainly -- you know, here in paragraph 123, I'm focusing my comments on -- on the [redacted] and what was provided to me through those [redacted].

Q. So the first bullet on page 67 also mentioned a filed called [redacted]

Do you see that?

A. Yeah. [redacted]?

Q. Right. Did you review that file?

A. No, I did not.

Q. All right. [redacted]s?

MR. LINK: Objection. Vague.

A. I didn't look at those details of the -- of the [redacted].

This bullet is really indicating that -- that these two files were provided to Apple, and I understood that they were being provided to Apple.

And my understanding was that they contained details about that -- [redacted] that would have -- that pertain to the claimed

invention specifically with the corresponding effective focal length and total track length.

Q. Okay. But, again, with respect to the [redacted], your understanding that it contained details about effective total track length and effective total track -- sorry, total track length and effective focal length is not based on any data that you reviewed, other than the email itself?

A. I used all of the materials in forming my opinions. That includes any analysis that Dr. Moore would have done; the declaration of the head of Corephotonics and other materials. And -- and that -- you know, I was able to make these statements.

The statement says that I understand that those -- those files were provided on September 19, 2013.

In addition to that, I -- my understanding is that they would have contained information on such a zoom lens, such a Tele lens.

Q. You haven't seen any data about the effective focal length or the total track length of the [redacted], right?

A. Not in those files. I reviewed other information that -- that also, you know, described the parameters of the Tele lenses that Corephotonics was able to provide that was consistent with my understanding of what would have been in those files.

Q. But you have not rendered an opinion about whether the [redacted] referenced in the first bullet on page 67 would meet the claim limitation of any claim in the '479 patent, right?

A. It's my understanding that they would have, but I don't believe there's an opinion in my Declaration stating precisely that.

Q. What is the difference between a [redacted] file and a [redacted] file?

A. I have not used Zemax extensively enough to determine that. Perhaps one is a binary compressed version, but I don't know.

Q. So the first bullet point on page 68 references [redacted].

Do you see that?

A. (Witness reviewing document.)

Q. It's the very last phrase of that

bullet.

A. Okay. Yes.

Q. Okay. Are the [redacted] you're describing on page 68 different from those that you described on page 67?

A. I don't recall the details. They might be.

Q. Okay. Did you see the [redacted] that is described in the first bullet on page 68 of your Declaration?

A. No. I did not dive into that.

Q. Do you know whether the [redacted] of algorithms and simulations described on page 68 of your Declaration would meet any claim limitations of the '479 patent?

A. I believe all of these bulleted items are pertinent to the inventions of the '479, and that was my understanding in making these opinions.

Q. Have you done independent analysis of whether the items described in the bullet point list in your Declaration meet any claim limitations of the '479 patent?

A. I --

MR. LINK: Objection. Vague.

A. -- haven't looked at my --

THE WITNESS: I'm sorry. Go ahead.
MR. LINK: I just said objection. Vague. You can answer.
THE WITNESS: Okay.
A. I was focusing my analysis on the claimed invention, the invention as specified in the claims as a whole.
Q. Okay. Well, have you done any independent analysis of whether the items described in the bullet point list in your Declaration meet any claim of the '479 patent?
A. Nothing beyond what was provided in the [redacted]. I didn't see any -- any need to dive deeper than to accept the assurances provided to me through the -- through the [redacted] and the other information provided to me.
Q. What about the [redacted] that you reviewed indicated that the items you've described in your bullet pointed list practiced the '479 patent?
A. Their description; you know, the declarations by Dr. Moore, by Dr. -- by the head of Corephotonics; and the other materials I had seen and the other descriptions of them in the emails.
Q. Okay. You also referenced some licenses that Corephotonics entered.

Did you review any of those [redacted] for your work in these IPRs?
A. I don't recall. I saw a lot of discussion of licenses and a lot of legal documents. I don't recall if any of them was specifically licensed or not.
If I had, it would appear in my list of materials considered, but I don't see any opinion here that discusses a specific license versus, you know, opinions regarding discussions of licensing.
Q. So if you look at page 125 of your Declaration.
A. You mean paragraph 125?
Q. Yes. Paragraph 125, the top of page 70, after footnote 7, there's a sentence that says, "Other companies who have taken licenses to Corephotonics' technology include."
And then you list a whole -- you list several companies that have licensed Corephotonics' technology, right?
A. Yes.
Q. Which of those licenses covered the '479 patent?
A. My understanding is that each and every one of those licenses includes '479 technology and

that these licenses are evidence of industry-wide respect for the patented technology.
Q. Okay. But you did not review any of those licenses yourself, correct?
A. My understanding -- and I did not review -- I did not read each of those licenses. They were provided to me through the Kali declaration, the head of Corephotonics, but my understanding is that each of these licenses included the '479 technology.
Q. Okay. Who told you that each of these licenses includes the '479 technology?
A. I believe that was communicated through the Kali declaration.
Q. Okay. What else is covered by these licenses?
A. I don't -- I don't recall. I don't know that that was provided. I just know that the '479 technology was covered by these licenses.
Q. Do you know what motivated these companies to take a license to Corephotonics' technology?
A. I suppose you'd have to ask each of these companies that question. I did not discuss this with each of these companies.

My understanding is, the '479 technology motivated these licenses, based on what I've seen.
Q. What -- what is that understanding based on?
A. Well, for example, Apple's desire for the '479 technology. I think Apple is a producer of mobile devices with -- with phones. Many of these other companies do the same thing. I think they would have had similar interests.
Q. Okay. But have you seen any information to show you that these licensees, as listed on page 70 of your Declaration, were looking to get a license specifically to the '479 patent?
A. You would have to ask those other companies why they were getting the licenses.
My -- my understanding is that each of these licenses included the '479. If these companies did not want the '479 technology, I assume they would have left that out of the agreement and tried to revise the agreement differently because of that, but they didn't eliminate the '479.
My understanding is that the '479 technology was included in each of those agreements, which means that the companies valued it.
Q. Well, wouldn't it be equally safe to

assume that if the licenses covered other patents, that those companies also valued the other patents covered by the license just as much?

A. I believe this section of my opinions is looking for industry-wide respect for patented technology. I think there could be industry-wide respect for a variety of different technologies. I think the '479 received industry-wide respect because it was included in these license agreements, regardless of whether other technologies were also included.

Q. In your opinion, is there a nexus -- excuse me.

Is there a nexus between the licenses that you list on page 70 of your Declaration and the '479 patent?

A. Yes. There's certainly a connection. The fact that they were listed; the fact that all of these companies wanted license specifically to that technology provides a nexus.

Q. But you don't know that those licensees wanted licenses specifically to that technology, right?

A. I believe I do know that by the fact that the license -- that that technology was

included in these licenses.

Q. And, again, you didn't do any analysis of the licenses to see what was covered in the licenses, correct?

MR. LINK: Objection. Asked and answered.

A. I'm going by what was provided to me through the Kali declaration.

Q. Do you know how much these parties paid for licenses to the '479 patent?

A. I don't believe I included that in any of these opinions. Off the top of my head, I don't recall.

Q. Does the price a party paid for the license impact whether that license is evidence of industry-wide respect for the patented technology?

A. I don't know that that factored into my analysis of these particular considerations. I do know that Samsung acquired Corephotonics for a price point of 155 million, but I believe that's the only mention I see of an actual amount of money.

Q. How much of that $155 million was related to the '479 patent?

A. So in looking, for example, at Apple's interest in working with Corephotonics and why Apple

was interested in Corephotonics, there was definite interest in the '479 technology.

So I don't have a specific dollar amount, but I do believe that the '479 technology was significant in what Corephotonics had to offer and played a significant role in -- in that purchase and -- enough to show commercial success.

Q. Well, Corephotonics has several U.S. patents, right?

A. I don't recall. I only looked at the '479.

Q. Well, are you aware that there are several other IPR proceedings involving Apple and Corephotonics?

A. No, I wasn't aware of that.

Q. Okay. So do you know how many patents Samsung would have been acquiring as part of its acquisition of Corephotonics?

A. I know that the articles regarding Samsung's acquisition of Corephotonics focused on camera technology, including the '479. So I think that shows commercial success.

I think many of the other patents that Corephotonics has may also have been commercially successful, but the focus of my opinions here are on

the commercial success of the '479.

Q. Well, isn't Corephotonics' entire business focused on cameras and lenses and image processing for mobile phone devices?

A. I believe largely. I didn't look at a complete listing of what Corephotonics does, but I do know that Corephotonics does do that.

Q. Well, how can you assume that just because a company like Apple or Samsung, who are interested in mobile phone cameras, how can you assume that a company like that talking to Corephotonics is related to the '479 patent?

A. I don't think that's what I'm stating. All I'm stating is that the '479 patent was valuable; it -- it demonstrated commercial success; and it, you know, demonstrated repraise, it demonstrated licensing, and it even demonstrated, you know, failure of others in copying.

And these are -- these are supporting that specifically for the '479.

Q. So you mentioned that there were articles regarding Samsung's acquisition of Corephotonics and that those focused on camera technology.

Which articles were you referring to?

A. There's a list of three on paragraph 128.
Q. Do -- or which of those three articles specifically mentioned the 479 patent?
A. These are articles in Forbes, in Globes, and in Engadget. You know, when I read those articles, I get a high level indication of what's going on. They don't dive into specific patent-level technology details like CMOS cameras versus other -- other forms of cameras and so on.
So these -- the titles of these are rather telling, though, that "Samsung Buys Significant New Camera Advantage Over Apple"; "Samsung Bought a Company to Improve Its Phone Cameras."
And the '479 was included in that purchase, and the '479 provides an invention that improves phone cameras.
Q. How do you know that Samsung's acquisition of Corephotonics was motivated by the technology of the '479 patent as opposed to any of the other multiple patents that Corephotonics owns on mobile phone technology -- mobile phone camera technology? Excuse me.
A. Largely through examining, you know,

many of the [redacted] and so on documenting the interest of Apple. I think Apple and Samsung have, you know, been competing over phone technology, camera technology in phones.
I believe Samsung's interest in Corephotonics would have been similar to Apple's interest in Corephotonics. And Apple was clearly interested in the '479.
Q. Okay. I will represent to you that there are about 15 patents at issue in IPRs between Apple and Corephotonics and that they all deal with various aspects of mobile phone camera technology.
How do you know that Samsung's acquisition of Corephotonics related to or has a nexus to the '479 patent as opposed to any of the other about 14 patents that Corephotonics has at issue in IPRs against Apple?
A. You would have to ask Samsung a question about why Samsung purchased Corephotonics. I'm providing an opinion based on the information I was given.
The information I was given made it quite clear that Apple was interested in the '479 specifically, the '479 technology and invention specifically. And my understanding was that Samsung

would have been interested for the same reason.
Q. Is it your opinion that there is a nexus between evidence of Samsung's acquisition of Corephotonics and the nonobviousness of the claims of the '479 patent?
(Witness reviewing document.)
A. Can you ask that question again?
Q. Sure.
A. It's a very legal question.
Q. Right. So we talked earlier -- I can break it down a little bit. See if this helps.
We talked earlier about how evidence of secondary considerations of nonobviousness must have a nexus to the claims of the '479 patent, right?
A. (Witness nodding.)
Q. Okay.
A. Yeah. You asked that earlier, yeah.
Q. Okay. And you agree, right, that that nexus must exist?
A. Yes.
MR. LINK: Objection to the extent it calls for a legal conclusion.
A. Yeah. And that's my understanding. I'm not a lawyer.
Q. Right.

Is it your opinion that there is a nexus between Samsung's acquisition of Corephotonics and the '479 patent?
Actually, let me -- let me scratch that question and make -- give you one that's more precise.
Is it your opinion that there is a nexus between Samsung's acquisition of Corephotonics and the claims of the '479 patent?
MR. LINK: Objection. Vague.
A. So paragraph 129 of my Declaration:
"Patent Owner's acquisition by Samsung ... is evidence of Patent Owner's commercial access [sic] and is attributable to Patent Owner's innovative technology, including its smooth transition algorithms."
That would have been facilitated by the '479.
"It is thus evidence tending to support the nonobviousness of the challenged claims."
So --
Q. Which claims of the 47 -- I'm sorry. I'm sorry.
A. Go ahead. I don't think I had anything else.

Q. I didn't mean to interrupt you. I'm sorry, Dr. Hart.

Which claims of the '479 patent claim a smooth transition algorithm?

A. So claim 1, for example, it has a camera controller that fuses the Wide and Tele images. And in the process of smoothing -- of fusing those images, it can give you a smooth transition between the images in either sensor as you're switching from one to the other in a zooming operation.

Q. So your position is that the -- your opinion is that the '479 patent requires a smooth transition algorithm?

A. No. That's not what I said. One of the benefits of '479 is that its image fusion supports the ability to provide a smooth transition.

Q. Okay. But your opinion is that Samsung's interest in smooth transition algorithms supports a nexus between Samsung's acquisition and the '479 patent claim?

A. Yes. I believe so. That's what I'm saying here, that including its smooth transition algorithms, which -- which is -- and that Samsung's purchase of Corephotonics is attributable to Patent Owner's innovative technology, including the smooth

transition algorithm.

Q. Doesn't the '479 claim a fusion algorithm?

A. I'm sorry. Can you repeat that? I don't know if I heard all of that.

Q. Sure. Doesn't the '479 patent claim a fusion algorithm?

A. Claim 1 has a requirement for a fused image where that fused image has the point of view of the Wide camera.

MS. SIVINSKI: So I think we've been going a little bit over an hour. Do you want to take a break, or are you okay to keep going?

THE WITNESS: I'm okay to keep going if everybody else is.

MS. SIVINSKI: Okay.

BY MS. SIVINSKI:

Q. Let's turn to paragraph 124 of your Declaration.

I'm sorry. Before we do that, let's go back to the licenses we discussed earlier.

Is it your opinion that there is a nexus between the licenses that we discussed earlier and the claims of the '479 patent?

A. I didn't map those licenses to specific

claims. The claims as a whole, "the claimed invention" is the term I used in that section.

Q. Okay. Now let's go back to the paragraph -- or let's go to paragraph 124.

In this paragraph, you're talking about Apple's interest in potentially licensing Corephotonics' IP, right?

A. Yes.

Q. And those discussions would have occurred, according to your Declaration, in August of 2016?

A. Yes.

Q. And that's a year and a half before the '479 patent issued, right?

A. (Witness reviewing document.)

Q. Sorry. Two and a half years. I can't do math.

A. I was going to say. August 2016 and the patent issued March of 2019.

Q. Okay. So let me ask the question again, doing math correctly this time.

The discussions between Corephotonics and Apple about licensing Corephotonics' IP that you discuss in paragraph 124 would have occurred two and a half years before the '479 patent issued, correct?

A. Yes. Before the date of the patent.

Q. Okay. And the only patent that you discuss in this paragraph of your Declaration is the '291 patent, correct?

A. I believe so, yes.

Q. Okay. Have you compared the claims of the '291 patent to the claims of the '479 patent?

A. I wasn't -- you know, that didn't seem to be relevant to the declaration -- you know, the opinions provided by the Durand declaration. I wasn't mapping specific claims to specific items in this section. It was really to the claimed invention.

Q. Well, how do you know that Apple's interest in licensing Corephotonics' IP demonstrates the nonobviousness of the claimed invention if those discussions happened before the claimed invention was even patented?

A. This is based on a provisional application and the previous application. I -- I looked at the file history. And so based on what I looked at before, the invention, you know, remained consistent with everything I've seen.

So I didn't -- I didn't see any -- any changes major enough to alter my opinion, based on

the previous iterations of the patent that had been filed.

Q. But you have no -- you have not done any independent analysis to determine the difference in claim scope between the '291 patent and the '479 patent, correct?

A. Not independently. I've -- I've been responding to, you know, the IPR and providing opinions relevant to the IPR that include examining the file history and the issues relevant to the patent, the invention of the patent. And that dates all the way back to the priority date of 2013.

Q. Did you review Corephotonics' fusion algorithm as part of your work on the 905 and 906 IPRs?

MR. LINK: Objection. Vague.

A. I reviewed the specification of the '479. Are you asking about something beyond what's documented in the '479?

Q. Yes. Did Corephotonics share with you any fusion algorithms as part of your work for you to review in these cases?

A. Everything I examined is listed in my materials considered. There's some literature, some articles, and so on about the technology. I

reviewed those. I didn't -- I wasn't provided anything by Corephotonics that isn't listed in my materials considered.

Q. Did you ask to see any of Corephotonics' fusion algorithm?

MR. LINK: Objection. Vague.

A. No.

Q. Okay. Did you review any Apple products as part of your work on the 905 and 906 IPRs?

MR. LINK: Objection. Beyond the scope.

A. My opinions regarding Apple products are as provided by the materials considered. I didn't ask Apple for any further information beyond the materials considered, but that material considered was convincing to determine, you know, Apple's use of similar ideas.

Q. Which -- well, let me back up.

It's your opinion that there's evidence that Apple copied the invention of the '479 patent, correct?

A. I -- yeah. I show that there's evidence of Apple's copying of the '479 technology, and that evidence is from the Patent Owner. And that also supports my conclusion of, in general, the failing -- failure of others in copying as the

secondary considerations.

Q. Which of the Apple products do you think copies the '479 patent?

A. One that's mentioned in this Declaration is at paragraph 133. I describe the iPhone 7 in fall of 2016.

Q. Did you review any information about the iPhone 7 or the iPhone 7 Plus, specifically, the cameras or algorithms that those devices use, in your work for these cases?

A. Yes.

Q. What did you review?

A. Well, one thing I reviewed is this forums thread from the Apple developer forum that's cited in the -- in paragraph 133.

Q. Was there any information in that forums.developer thread about the lenses in the iPhone 7 and iPhone 7 Plus?

A. I think I provide an example quote there. That example quote just speaks of the Wide angle and Tele photo cameras. It doesn't specifically talk about the lens technology in that particular quote.

Q. Is there anything about the -- let me -- let me read your answer and make sure I ask an

intelligent question to follow up. Hold on one second.

Does that forums.developer article speak at all about the autofocus mechanism, if any, that the iPhone 7 or iPhone 7 Plus used?

A. I don't recall off the top of my head.

Q. Does that developer -- or forums thread include any information about whether the iPhone 7 and iPhone 7 Plus generate a fused image?

A. Well, the part I did reproduce here says that "the Dual camera intelligently fuses image" -- "images from the wide-angle and telephoto cameras to improve image quality."

Q. Do you know whether the fused image that is discussed in that thread meets the claim limitations of any claim in the '479 patent?

A. Well, the fact that it discusses image fusion and especially intelligent image fusion indicates to me that we would be talking about claim 1.

Q. Okay. Is there only one way to fuse images?

A. There can be any number of ways to fuse images. There can be any number of ways to do it intelligently. In order to do it for cameras, the

way that a dual-camera system would intelligently fuse images to improve image quality, so that there's no obvious transition, that kind of image fusion was described by the '479 patent.

This is one of several reasons I list in paragraph 133 that leads me to believe that the iPhone 7 was using approaches based on the invention of the '479.

Q. Well, how do you know that the Apple products you reference in paragraph 133 copy Corephotonics' technology if you don't know whether they meet any of the limitations of the '479 patent?

A. I mean, I say that it's "strongly implied by the course of conduct between the parties and the timing of Petitioner's announcement of the dual-aperture camera in their iPhone 7 series."

So the timing is suspicious. The announcement and the technology described is -- is suspicious.

So I think there's a strong implication there. That's what that paragraph is saying.

Q. But you haven't done any analysis to see whether Apple's technology or Apple's iPhone 7 or iPhone 7 Plus meet the claim limitations of the '479 patent, correct?

MR. LINK: Objection. Compound.

A. What I saw was convincing enough to suggest that Apple had built its own camera and image processing technology based on the technology -- technology at issue with the '479. And that supported the conclusion that the challenged claims are not obvious for the purposes of the IPR.

Q. Okay. That did not answer my question. So let me ask it again.

A. Okay.

Q. Have you done any analysis to see whether Apple's iPhone 7 or iPhone 7 Plus meet the claim limitations of the '479 patent?

MR. LINK: Objection. Compound.

A. I thought I just answered that question. You know, the analysis that I did is based on the materials I considered for this report. I've got paragraphs 130 through 134 describing in detail what evidence I used to determine failure of others in copying as evidence of nonobviousness.

And then I arose at that conclusion, based on that evidence.

That's the extent of the analysis I performed. I didn't -- I did not perform further evidence than what I -- further analysis than what I

documented in paragraphs 130 to 134 to come up with the conclusion that -- that's listed at the end of those paragraphs.

Q. Okay. You state in your Declaration at pages 66 and 67 that Corephotonics provided samples of fused images to Apple. And there are several different instances of that. So we can go through them one by one if you'd like.

The last bullet on page 66 says that:

[redacted]

Do you see that?

A. Yes.

Q. Do you know which image fusion algorithms Corephotonics photos used?

A. I don't know that I have any opinions on image fusion algorithms. What I have is what's provided in the '479 in the specification that describes how the '479 approached image fusion.

And the -- these paragraphs were -- were provided by the Patent Owner in a public complaint as being pertinent to the '479.

Q. Do you know whether [redacted]

[redacted]

(Witness reviewing document.)

A. I examined these [redacted] and the declaration of -- of the head of Corephotonics that included the licensing discussions between Patent Owner and Petitioner, and I've included a subset of that in these [redacted].

And so my understanding is that through that declaration and the complaint, that these [redacted] are pertinent to the '479.

Q. Okay. Do you have an opinion on whether the [redacted] used the technology claimed in the '479 patent?

A. That would be my understanding, based on the source of the selection of these [redacted].

Q. Even though these [redacted] the '479 patent issued?

A. The '479 -- where is it?

The '479 dates back to a provisional application filed June 13th, 2013. So this is July 2013. I think the invention and the priority date I've been using for my analysis of the invention is consistent with -- with this

information.
Q. So you said that you had an understanding, based on the source of these [redacted], [redacted] practiced the technology claimed in the '479 patent.
What do you mean by that?
A. I mean paragraph 123.
"I reviewed emails and documents dating from 2012 through 2017, as well as the Declaration of [the head of Corephotonics] [that describes Corephotonics' business, its licensing history, the relevant facts ... and several documents that corroborate the allegations in Patent Owner's Complaint. I have attached a small selection of those communications and documents [in these bullets]."
And so it's the corroboration of these discussions and those other materials that lead me to believe that these are relevant for the '479.
Q. So the fact that '479 put it in its complaint says -- or is enough for you to conclude that these images shared in 2013 practiced the '479 patent?
MR. LINK: Objection. Mischaracterizes

testimony.
A. I'm saying that there's a corroboration there that all of these are -- support each other, including the declaration of Eran Kali, the head of Corephotonics. That declaration was signed under the same circumstances that I signed my own declaration.
Q. How many patents are asserted in the complaint that you reviewed?
A. I don't recall. I just looked at the fact that the '479 was -- was -- was in there, that these were appropriate documents for the '479.
Q. Well, does that complaint assert more than just -- more patents than just the '479?
A. I don't recall.
Q. So you also mentioned in the second bullet on page 57 that [redacted]
A. Yes.
Q. Are those different [redacted]?
A. I don't think -- I don't think it indicates whether they're the same or different.
Q. Did you review the [redacted]

[redacted]?
A. No. I just examined this [redacted] describing Apple's reaction to [redacted].
Q. Other than the fact that this [redacted] was described in Corephotonics' complaint, do you have any other reason to believe that the [redacted] practiced the technology claimed in the '479 patent?
A. I believe that those [redacted] practiced the invention, as provided to me through, in part, the declaration of Eran Kali, which would have been signed under the same -- with the same assurances that I signed my own declaration.
Q. So you did not do an independent analysis to determine whether these [redacted] practiced the 47 -- or were created using the '479 claimed technology, correct?
MR. LINK: Objection. Compound. Vague.
A. Not beyond what I've described in these paragraphs.
Q. I want to go back to the bullet on page 68 of your Declaration that mentions a [redacted].
Do you see that?
A. Yes, I see that.

Q. What do you mean by [redacted]?
A. I mean that the complainant -- the complaint states that in paragraph 33 that the relevant software was provided by Corephotonics to Apple. [redacted]. And --
Q. What is that? I'm sorry. Go ahead.
A. I didn't have anything further.
Q. Okay. What goes the -- what does the term "black box" mean there?
A. "Black box" means that you can see the effects, but not the process.
Q. Okay. So in paragraph 126 of your Declaration, you cite to several online articles and a Tweet, I think, as evidence of industry praise for Corephotonics' technology, right?
A. Yes.
Q. Okay. Which of these cited materials in paragraph 126, if any, specifically discuss the '479 patent?
A. As I mentioned before, with industry articles, these are press releases, Tweets, and there are news articles. They talk about the

technology in more general terms than attributing any particular technology to a particular patent, but they do provide evidence of the utilization of technology that would have been described by the '479.

Q. Which specific technology did those articles describe that relates to the technology claimed in the '479 patent?

A. I don't think that opinion goes into that level of detail. I believe that it was focused on general advancements in the area of mobile phone tech -- photography technology. And, you know, that leadership is further evidenced and connected to the '479, for example, by Apple's interest.

Q. But as we discussed earlier, you don't have any information to suggest that Apple's interest was specific to the '479 patent, do you?

A. I thought we just spent quite a bit of time explaining that I do believe Apple's interest was related to the '479, based on the -- how these [redacted] were compiled and provided to me. And they corroborate the other information, as provided through other declarations.

Q. But, again, you don't know whether the complaint that references these documents is limited

to assertion of the '479 patent, right?

A. The --

MR. LINK: Objection. Vague.

A. The complaint includes the '479 patent -- the Declaration includes the '479 patent.

These [redacted] were pertinent to the '479 patent, as provided through these materials, including their complaint, which would have been signed under the same conditions I signed my own declaration.

Q. Okay. You have an understanding that all of these materials are related to the '479 patent, based on Mr. Kali's declaration, but, again, you haven't done any independent analysis to analyze whether the information provided in these [redacted] actually related to the '479 patent, correct?

MR. LINK: Objection. Asked and answered.

A. The analysis I performed is based on my materials considered using the techniques described in these paragraphs. I have not performed any analysis beyond what I've described.

Q. Okay. In paragraph 130 of your Declaration, you talk about the failure of others to

successfully address problems stated in the '479 patent using "position matching and image registration to reduce the image jump effect," right?

A. Yes, I see that.

Q. Does the '479 patent talk about the image jump effect?

A. So as I mentioned before, claim 1 talks about image fusion and specifically being able to fuse the images from the Wide and Tele image sensor into a point of view from the Wide sensor.

And by using the methods in '479, for example, registration based on rectification, that would reduce or eliminate any jump effect when switching from a Wide image to a Tele image by using a fused image as a transition.

Q. Can you point me to any specific portions of the '479 specification that talk about image jump effect?

A. I don't recall the term "image jump effect" being used in '479. But image jump effect is one of the ways that -- that an end user would describe technology that didn't, for example, use the invention of providing the '479; namely, image fusion and fusing a Wide and Tele image into a resulting image from the Wide point of view.

Q. Are you familiar with a company whose name I think is pronounced Linx, but it's spelled L-I-N-X?

A. I don't recall that from these opinions, and I don't believe I've encountered that company before.

Q. Okay. So let's go back to the '479 patent and --

MR. LINK: Stephanie, really quickly, is your realtime working for you?

MS. SIVINSKI: No.

MR. LINK: Okay.

THE VIDEOGRAPHER: The time is 3:55 p.m., and we're going off the record.

(Recess taken.)

THE VIDEOGRAPHER: The time is 4:07 p.m., and we're back on the record.

BY MS. SIVINSKI:

Q. Okay. Ready, Dr. Hart? We have a couple more questions to go over.

So I want you to turn back to the '479 patent and then specifically to pages 2 and 3. There's a section called "References Cited," and it's very long.

Do you see that?

A. Yes.
Q. Okay. And there's a heading that says "US Patent documents," and it actually extends onto page 4 of the '479 patent.
Do you see that?
A. Yes.
Q. Do you know whether any of the cited U.S. patents in this list of references cited are assigned to Apple?
A. I did not look into that question, no. I didn't know which of these patents is assigned to Apple.
Q. Okay. So in paragraph 134 of your Declaration, you say that:
"The fact that some Apple patents cite the '291 patent" -- which belong to Corephotonics -- "is evidence that 'Apple has built its own camera and image processing technology based on the technology at issue in the '479 patent."
Did I read that correctly?
A. Yes. That Petitioner's own camera and image processing patents cite the '291, which the '479 claims priority. Okay.
Q. Right.

Okay. So I'll read the full paragraph again instead of paraphrasing. Maybe that'll make a clear record. So paragraph 134 of your Declaration says that:
"Numerous of Petitioner's own camera and image processing patents cite to the '291 patent (to which the '479 patent claims priority), as I previously explained. This suggests Apple has built its own camera and image processing technology based on the technology at issue in the '479 patent."
Did I read that correctly?
A. Yes.
Q. Okay. So I'll represent to you that nine documents in the list of references cited under "U.S. Patent Documents" in the '479 patent belong to Apple.
A. Okay.
Q. Do you also draw the conclusion that the fact that Corephotonics' patent cite Apple's patents means that Corephotonics has built its own camera and imaging processing technology based on the technology that Apple has patented?
MR. LINK: Objection. Vague.
A. I did not provide an opinion on that.

That didn't seem to be at issue. What was at issue was the obviousness arguments that Professor -- Dr. Durand had provided regarding the '479.
And I was -- paragraph 134 is showing that numerous patents cite the '291 and the '479, and that -- that goes to the invention described in the '479, in terms of the secondary considerations and copying and failure of others.
New patents are building off of the '479 and the preceding '291. And so that speaks to the originality and the level of invention provided in those patents.
Q. So does the fact that Corephotonics' '479 patent cites Apple technology change your conclusion, any of the conclusions in your Declaration?
A. No, it does not.
Q. Okay.
MS. SIVINSKI: I don't have any further questions for you, Dr. Hart. So I will turn it over to Mr. Link.
MR. LINK: Yeah. Let me -- why don't we take a quick break, and let me look at my notes and see if I have any questions. So let's just take a ten-minute break.

MS. SIVINSKI: That's good.
Off the record.
THE VIDEOGRAPHER: Okay. The time is 4:12 p.m., and we're going off the record.
(Recess taken.)
THE VIDEOGRAPHER: The time is 4:16 p.m., and we're back on the record.
MR. LINK: We, Corephotonics, does not have any questions either. So we'll just read and sign and go from there.
MS. SIVINSKI: Sounds good.
Thank you, Dr. Hart. I appreciate your time today.
THE VIDEOGRAPHER: Okay. The time is 4:17 p.m., and that concludes today's deposition.
Thank you, everyone.
THE REPORTER: And, Counsel, do we have any specific orders? Who needs a rough draft? Any expedited delivery?
MR. PARSONS: Haynes and Boone would like a rough draft.
MR. LINK: For Corephotonics, we don't need a rough draft, and just regular delivery is fine for us.
(Deposition concluded at 4:17 p.m. CST)

CASE NAME: Apple v Corephotonics

ACKNOWLEDGMENT OF DEPONENT

I, JOHN C. HART, Ph.D., declare under penalty of perjury, and hereby certify, that I have read the foregoing pages of my deposition transcript or the same has been read to me, and that the same is a correct transcription of the answers given by me on April 29, 2021 as to the questions therein propounded, except for the corrections or changes in form or substance, if any, noted in the attached Errata Sheet, with the understanding that I offer these changes as if still under oath.

____________ ____________________________

DATE SIGNATURE

ERRATA SHEET

NAME OF CASE: APPLE v COREPHOTONICS
DATE OF DEPOSITION: April 29, 2021
NAME OF WITNESS: JOHN C. HART, Ph.D.
Reason Codes:

1. To clarify the record.
2. To conform to the facts.
3. To correct transcription errors.

Page ____ Line ____ Reason __________________
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REPORTER'S CERTIFICATE

I, MAYLEEN AHMED, the undersigned, a Registered Merit Reporter, Certified Realtime Reporter, Certified Shorthand Reporter, and Notary Public, do hereby certify:

That the witness, JOHN C. HART, Ph.D., before examination was remotely duly sworn.

That the foregoing deposition was taken remotely stenographically by me on April 29, 2021, and thereafter was transcribed by me, and that the deposition is a full, true, and complete transcript.

I further certify that I am not a relative or employee of any attorney or counsel or any party to this action, and that I am not financially interested in the said action or the outcome thereof.

In WITNESS WHEREOF, I have hereunto set my hand this 6th of May, 2021.

____
/s/ MAYLEEN AHMED, RMR, CRR, CRC
Washington CCR No. 3402 - Exp 12/29/21
Oregon CSR No: 17-0447 - Exp 12/31/23
Texas CSR No: 9428 - Exp 7/31/21
California CSR No: 14380 - Exp 12/31/21
New York Notary Public

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